Selected Papers on Mineral Economics

Issues Affecting The Future of Ontario's Metal Sector

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NOTE:

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FOREWORD

Over recent years a number of smaller papers on a variety of mineral economics/mineral policy topics were commissioned by Mineral Resources Branch or were written by staff. Some were produced for presentations at Annual General Meetings of the Canadian Institute of Mining and Metallurgy as parts of the CIM's Mineral Economics Program.

They have not been readily available within only a short time of presentation because they did not warrant separate publications as Mineral Policy Background Papers or because space for publication in the CIM Bulletin was severely limited. It was therefore decided to collect some of continuing interest in the present volume and the CIM agreed to release for publication by the Ministry of Natural Resources those which had been presented at CIM meetings. The cooperation on the part of CIM in the preparation of this volume and particularly of its Executive Director, Mr. Pierre Michaud, is sincerely appreciated by the Ministry. The papers involved are individually identified on their cover pages.

The material included here was reproduced by and large in the form in which it was given. Although some economic and political conditions have changed in the meantime, it was felt that it would be preferable to convey the major concerns at the time of writing rather than to update. The major lessons drawn remain relevant, even if the urgency of some issues may have somewhat receded.

The first part "The General Framework" leads off with a speech by the then Minister of Natural Resources of Ontario, The Hon. Alan Pope, to the Financial Times Conference on Gold Mining in March 1983. The major message was that fears on the part of industry regarding security of title to mining lands in the context of planned revision of the Mining Act, and regarding the future development of Ontario's past very positive policy towards mineral development, were quite unfounded.

The second paper by Mr. G. H.D. Hobbs, one of the most experienced and perspicacious top executives of Canada's mineral industry, provides the overall context and the historical perspective within which the more specific topics covered in the other two sections must be viewed.

The papers in Section II "World Markets and Competitiveness", are intentended to fill out the framework of mineral economics as applied to policy analysis developed over the past decade by Mineral Resources Branch and published in its essentials in preceding Mineral Policy Background Papers.

The three main topics are Mineral Markets Forecasting, Productivity Change and Investment Impacts of Policy Changes. The focus in this section is on the analysis of policy factors and potential decisions that, to a considerable extent, can be affected or determined within Canada.

The selection of topics in Section III "Mineral Trade Issues", has been governed by the reality that for the present and for the forseeable future, the main market for our mineral industries and the main source for our investment funds is the United States-policy initiatives on the part of our past Prime Minister, P.E. Trudeau, seemingly to downgrade if not to destroy this relationship notwithstanding.

The opinions expressed in this last set of papers are not all necessarily shared by the Ontario Government. Nonetheless, it was considered important to convey to Canadian private and public sector mineral policy decision makers the flavour of U.S. policy analysis and policy development as they reflect perceptions south of the border. The focus in this section is therefore on policy elements framed outside of Canada, but subject to the influence of decisions taken in Canada.

It is hoped that this Mineral Policy Background Paper, as preceding ones in the series, contributes to the deepening and enlargement of understanding of both economic and policy factors crucial to the health of our Industry and thus conducive to its recovery and growth.

SECTION I

THE GENERAL FRAMEWORK

REMARKS

TO THE

FINANCIAL TIMES CONFERENCE ON GOLD MINING

March 11, 1983

BY

THE HONOURABLE ALAN POPE

MINISTER OF NATURAL RESOURCES

I'm happy to have this opportunity to participate with you in this conference--to talk a little about the outstanding developments taking place in gold mining in Ontario today.

I want to talk about the kinds of opportunities that we face now and will face in the future, and about some of the implications which recent developments have for Ontario's Ministry of Natural Resources, the part of government most directly concerned with the mining industry.

By recent standards, gold activity is at a very high level in Ontario today. And the reasons for those high levels of activity--the reasons for expansions at Red Lake, Kirkland Lake and Timmins, for the re-opening of Hollinger, for the developments at Detour Lake and Hemlo, and for the increase of staking and exploration which is taking place across the province--are a direct result of international market forces. They are firmly based on reasoned business judgments as to the longer-term trends that will exist with respect to gold prices.

Gold mining in Ontario is a big and important industry. But the fact is that our impact on world markets and world prices with respect to gold is negligible. We can't control the price. We can't change the international economic realities that dictate the price.

And the very rapid and marked fluctuations in gold prices that have occurred in even the last few weeks are a constant reminder that the viability of developments here will, in the final analysis, be dictated by an international market that lies beyond our control.

Gold prices are somewhat more volatile than the prices of most other metals.

And because gold prices are more volatile, both industry and government must be ready to move quickly if industry is to take advantage of new opportunities as they arise.

Government can't dictate international markets. But we can respond to them--quickly, effectively, prudently and well.

Today there are clear opportunities in gold. I believe there will also be opportunities in strategic metals.

I believe this total situation as it affects mining--the toughening of international competition which is affecting most of the established mining industry, coupled with emerging new opportunities--has a number of clear implications for government policy, and for the kinds of things that we in the Ministry of Natural Resources should be trying to do.

First, I would like to address some concerns expressed recently about government mining policies. These concerns have come from the mining, prospecting and financial communities, and in most cases arise from proposed revisions of our Mining Act and from land use planning discussions. They involve a wide variety of policies--including the security of mineral titles, the protection of confidential exploration data and the possible reduction in the Ontario land base open for exploration.

I wish to take this opportunity to ASSURE YOU THAT THE SECURITY AND THE PRINCIPLES OF ACQUISITION OF MINERAL TITLE WILL NOT BE ALTERED AND REASONABLE ACCESS TO CROWN LAND WILL REMAIN INTACT. And WE WILL NOT RELEASE PROPRIETARY DATA GIVEN TO US IN CONFIDENCE, UNLESS AGREED TO BY BOTH SIDES. These principles have all been cornerstones of Ontario's mineral policy for well over 75 years we do not plan to change them.

I WISH TO ASSURE YOU THAT LAND USE PLANNING WILL NOT SIGNIFICANTLY AFFECT THE LAND BASE OPEN FOR EXPLORATION. I am firmly committed to the principle that Crown land should be used in a way that offers the most benefits for the most people. In addition, I believe we should stress flexibility in our planning whenever possible.

I think today's gold story is an excellent illustration of the co-operation between government and industry.

The first gold discovery near Hemlo was made in 1869. The area there has been staked, and re-staked, time and again over the years. It has been explored and mapped and explored and mapped again.

And then, two years ago, more than 100 years after the first discovery in the Hemlo area, the deposits were discovered. I think it is fair to say that my ministry contributed to the Hemlo discovery--although our staff would be the first to give credit to the prospectors Don McKinnon and John Larche, and to Dave Bell who had the instinct and knowledge to see the value of the area, to convince enough backers to share his enthusiasm and to begin drilling.

Much of the work of these private groups was based on mapping undertaken by my ministry's Ontario Geological Survey in the late 1970s. The OGS selected areas to be mapped based on a recommendation by the Ministry's regional geologist at Thunder Bay. In 1980, an open file report was made available at ministry district offices in Sault Ste. Marie and Thunder Bay identifying an assay of .32 ounces of gold per ton about four kilometres west of the current discovery. This sparked renewed interest in the Hemlo area.

Three of the companies involved in Hemlo--Corona Resources, Goliath Gold and Golden Sceptre--all used the Ontario Mineral Exploration Program to help finance early exploration.

I was pleased this week to present the annual Prospectors and Developers Association award for prospector of the year to three of the men involved in developing Hemlo--Dave Bell, John Larche and Don McKinnon.

I understand the prospectors also used information from one of my ministry's mineral deposit circulars as a basis for some of their work at Hemlo.

I think we have all learned a valuable lesson at Hemlo--not to give up. Had we believed conventional wisdom, Hemlo would have been deserted long ago.

By not giving up, by continuing to search an area that many others had searched unsuccessfully, we were able to seize the new opportunities being created for us by international market trends.

As you know, gold has been the key to increased exploration in Ontario in recent years. Because of recent gold finds, we are surpassing the staking level of earlier boom years. In fact, Hemlo has sparked Ontario's fourth-biggest postwar staking rush.

More than 33,000 claims have been staked in Ontario each year for the last three years. This compares with about 15,000 claims each year in 1977, 1978 and 1979. And there were well over 1.7-million days of assessment work in 1982, compared with about 550,000 days in 1979.

Nothing might have happened without the combined efforts of government and industry. Credit must go to the large and small mining companies, junior companies, banks and stockbrokers, prospectors and government agencies. And those of us in Ontario should never forget the crucial role the Vancouver Stock Exchange played in raising the capital for the exploration at Hemlo. I trust we will all profit from that experience.

The lesson Hemlo taught us is to never give up, no matter how often an area is studied. In some cases, we may be misreading geological information; in other cases we may be misreading the market value.

Hemlo illustrates this clearly. The gold is there and the market is ready for it. On Monday, just three days from today, tenders will close for the sinking of the first mine shaft at the Golden Giant No. 1 mine. The project is being jointly undertaken by Noranda Mines Ltd., Goliath Gold Mines Ltd. and Golden Sceptre Resources Ltd.

Hemlo is an opportunity we just as easily could have missed.

My ministry has the responsibility to increase the opportunity for discoveries such as the one at Hemlo. Our mandate is to provide the mapping and data base that facilitates discovery. An that's exactly what we are working to do today.

Our Precambrian Geology Section is continuing with its mapping programs. Their work ranges from regional reconnaissance maps to detailed 1:15,000 scale maps. Thanks to this group, we have one of the best quality geological data bases found anywhere in the world.

The challenge for us, of course, is to build on that basic information in response to specific opportunities and specific questions as they arise.

As I mentioned earlier, staff from the Precambrian Section of our Ontario Geological Survey were in the Hemlo area before the initial discovery.

We have to be ready with the right information if we are to help Ontario industry seize exploration opportunities. The OGS identifies rock formations on maps to outline mineral occurrences. They start with aerial photographs, then send in ground survey crews to study rock outcrops and add this information to the base maps.

It is no surprise that OGS crews are often nearby when mineral deposits are found, such as happened at Hemlo. Also, our program to map the Sturgeon Lake area started the same year as the first base metal finds were made.

And we are certainly not through at Hemlo. This year, the Precambrian Section will continue to provide up-to-date geological information to the companies and individuals exploring in the area.

And we are hard at work in other areas as well. Mapping is continuing in the Timmins area, the Kirkland Lake area, the Lake of the Woods area. Precambrian geologists are also looking to the future, at sites that may be a poor risk today but could result in a major find tomorrow such as the English River Gneiss Belt.

The continuing challenge for the Precambrian Section geologists, indeed the continuing challenge for all my ministry, is to stay ahead of the exploration companies to be ready with the information when it is needed.

This means more than mapping. Since the Hemlo find, the majority of the geologists in the Mineral Deposits Section of the OGS have been concentrating on interpreting the geological lessons at Hemlo in a way that will assist and

support the efforts of industry to plan and carry out effective exploration programs for gold in Ontario.

You'll be able to see some of the results of that work possibly as early as next month when we release a major publication called The Geology of Gold in Ontario, edited by Dr. Sandy Colvine of our Mineral Deposits Section. It's a preliminary effort to interpret the geological lessons we learned from the Hemlo find. It's also the most comprehensive work on the geology of gold in this province since 1948.

The Geology of Gold in Ontario will offer basic geological information on the style and occurrence of gold that I am sure will help in future exploration. I also expect it will encourage more applied research, strengthening the cooperation between our universities and private industry.

We anticipate a tremendous demand for this book and will print 3,000 copies in the first year alone.

It is vital that we maintain our ongoing programs of Precambrian mapping because that unparalleled data base can translate into a real competitive advantage for the mining industry in the discovery of new deposits.

And we must maintain and, if possible, enhance our ability to focus resources on areas of identified opportunity to provide the more detailed interpretive work that can add immeasurably to the effectiveness of exploration on a provincewide basis.

We are doing that--effectively, I think--in the case of the opportunities that exist today for gold. And we must do it with respect to any other opportunity the international market creates. We must provide the basic geological information that is needed to permit the industry to match Ontario's potential with international market realities.

It almost goes without saying that we are strong supporters of innovative technology that will ensure Ontario's reputation as a world leader in new mineral exploration techniques.

In the next year, the OGS will acquire, through the assistance of the Board of Industrial Leadership of BILD, a new computerized elemental analyser system developed by a small Ontario high tech firm, SCIEX of Thornhill. This system--which represents a technical breakthrough in analytical methodology--could have a significant impact on our search for new mineral deposits in the province.

And I believe we must also continue to work with the industry to respond to financial constraints to exploration-constraints which, after these last few difficult years for mining, are indeed serious.

The Ontario Mineral Exploration Program, in my opinion, does that effectively today. OMEP offers grants and tax credits of up to 25 per cent of eligible exploration expenses to individual entrepreneurs, non-mining exploration and other companies. Since it began two years ago, it has contributed to a number of important gold discoveries--including Hemlo. In that time, OMEP has assisted 400 exploration projects that have invested a total of $87-million on exploration.

As you know, over the years we, in government, have done studies of the problems involved in the financing of exploration and of junior mining ventures in particular. And I believe this must continue to be an area of concern to us, and an area of discussion between our ministry and the industry as a whole.

So--where does all this lead us? Well, I believe that it leads us to some basic principles which should form the foundations of our strategies with respect to the mining industry over the next number of years.

What are these principles?

First, I believe we must constantly examine the policies and programs of government to ensure that, wherever possible, they contribute to the ability of our existing mining industry to compete in international markets that will continue to be tough for some time to come.

For my ministry, that represents a clear responsibility to act as an advocate for the tens of thousands of people in Ontario who depend directly on--and the millions whose welfare is affected indirectly by--the mining industry, and for the communities that have been built based on the mining industry throughout the North.

The second principle that must, in my view, lie at the foundations of our strategy is the recognition that there are and there will be opportunities for the development of the next generation of mines in Ontario.

For government, that means we must be able to help in the identification of opportunities, and to respond quickly--with the appropriate geological information and studies--to assist the industry in seizing opportunities as they arise. It means a continuing effort to identify and minimize obstacles that prevent exploration programs from going ahead on a timely basis.

In a sense, the activity which is taking place in Ontario with respect to gold today--the very extensive activity--coupled with the prompt and effective responses of the Mineral Resources Group of my ministry--can serve as a model for us for the future, as we develop the capacities to respond more quickly and effectively to market opportunities as they arise.

We all must play a role if we are to meet these market opportunities. We cannot afford to let them slip by.

Industry needs us to provide the latest information and to help with incentives. And we need industry and the dedicated people in it to tackle new exploration ventures.

Neither side will succeed alone. We all share the responsibility for future mineral development.

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LESSONS OF THE PAST DECADE

by

Gerald H.D. Hobbs

This paper was originally presented at the
85th Annual General Meeting

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volume is gratefully acknowledged.

MR. CHAIRMAN, LADIES AND GENTLEMEN:

I am honoured to speak at your 85th Annual Meeting which has as its theme "Canadian Mining -- World Competitor?", and to participate in this session which is to examine the investment climate in Canada.

All speakers begin with a story, and I crave your indulgence for mine. This is an old Sufi story. The Sufis, as I am sure many of you know, are the radical Muslims who were excommunicated several hundred years ago for heresy. They believe that humans share in divine wisdom, and have the capacity to use that wisdom at will, for the good of all. Here is the story.

It seems that a learned man wanted to cross a river, and boarded a ferry boat. Since he was the only passenger, he climbed up to the bridge to talk to the Captain. "What do you do with your time?" he asked - "have you read this book?" The Captain replied, "No". "Well, then", said the scholar, "surely you have read this one -- it is such a famous work". Again, the Captain said, "no". "Let us talk then about this book, for you must have read this one -- it contains the accumulated wisdom of centuries". "No", said the Captain, "I have not read it either". "Tell me, do you know how to swim?" "No", said the learned man, "I have spent all my time studying". "Well", said the Captain, "you had better learn quickly because the boat is sinking!" Obviously, divine wisdom includes the practical.

In this country, we are not yet sunk, but we are sinking and we need a life preserver if we are to survive. I don't need to talk about the effect of rampant inflation, confiscatory taxes and blundering government actions on the investment climate in Canada over the last decade, nor do I need to dwell on the present recession, with its toll of unemployment and defeat. "What happened", we ask, "where in this land of promise did we lose our initiative, our energy, our hope and sense of adventure".

From the first question, there follows the obvious second question. "What can we do to repair the ravages of the past decade?" -- to find the answers to these questions, we have to go back nearly fifty years. Prior to the Second World War, Canada's economy was primarily agricultural and extractive. As a result of the demands of war with a sense of purpose and commitment, Canada, in a few short years, was transformed into an industrially based nation. The war eliminated unemployment and we created a nation with a sense of purpose, which in turn energized us to accomplish the vast social and industrial tasks which lay before us.

After the war was over, our industrial base continued to expand by the seemingly insatiable demand for the products necessary to rebuild Europe and Asia.

Our wealth creating capacity continued to grow through the fifties, and it was not until the mid-sixties that we began to be diverted by questions of wealth distribution rather than wealth creation. Government guarantees of security began to replace self-reliance; imposed regulations increasingly diminished initiative and individual freedom. These changes which began slowly accelerated rapidly. The last decade has seen the greatest change because the people who had been fired in the crucible of the last depression were being replaced by younger men and women who had known only ever-growing prosperity.

Many of us who are older had been shocked by our own experiences, were all too ready to grasp at the proposals of government help and the illusion of security. Few were the voices to endorse fiscal responsibility and many of us espoused the siren songs of simplistic solutions. The wealth creators were gradually supplanted by two groups; by academics with many theories but with no real economic understanding, and the other power-hungry individuals who believe that the instrumentality of government was a means by which they could best ensure that they first, and then secondly other Canadians, could be assured of "The Good Life".

As the academics presented hypothesis as fact -- the power-hungry group assured that the best state of human kind was passivity, as they, who knew best, would take care of all of us. Because they knew best that which would benefit us most they would provide so long as we gave them no trouble. If we became troublesome then the coercive force of law was the answer. Programs became compulsory and universal.

The manner in which the draconian change was accomplished is best described by a notorious politician who said: "Both with a ship and a country, one has to be in the wheel house or near the compass to see the change in direction which is taking place. I know that we, in Canada, have had the wheel spun, and I know that the rudder has been pressing against the sea for most of this decade. Perhaps the observer who was on the deck drinking his tea, sees the horizon in the same direction but does not realize that perhaps he will find himself arriving at a different land from the one which he thought he was sailing to.

The change in course was not agreed to by Canadians; but because it was done, degree by degree, few in our country noticed the change or realized the magnitude of the change in course which was taking place. We have come to a very different shore from the one for which we set sail -- and I for one, don't like it. Its a cold, inhospitable, rocky, authoritative, inhuman place.

Even now few realize that the problems facing our country are the accumulated costs of that change of direction. It was done little by little and it is only now, in 1983, that we see the magnitude of the change, and the dire economic consequences for all of us.

To illustrate the magnitude of the change, we must look back to the fifties and sixties. Canada, which had progressed at such a rapid pace in the early post war years, has, in the last ten years, dropped to the bottom of the productivity league. To give you an idea of the magnitude of our decline let me touch on the figures for the eighteen year period to 1980.

Our decline is largely due to the abysmally low rate of productivity growth. Some figures from the OECD tell the story. During this time, the annual growth rate in Japanese productivity was thirty-eight times that of Canada. The table shows Japan at the top with an average annual increase of 3.8 per cent, followed by West Germany at 2.9 per cent, France, 2.6 per cent, Italy, 2.1 per cent, Great Britain, 1.1. per cent and the United States with 0.2 per cent, and last and sadly least, the True North Strong and Free, Canada, 0.1 per cent.

With typical North American insularity, we make the mistake of constantly comparing our performance only with that of the United States. As the figures indicate, we are comparing ourselves with an economy infected with our own disease. We are both at the bottom of the ladder, and Canada is only 80% as productive as the United States.

By way of stark contrast, a quick look at Taiwan will show what has been happening elsewhere. Taiwan is an island of only 13,814 square miles, not much larger than Vancouver Island which has 12,408 square miles. Taiwan's population is just over eighteen million, some six million fewer than Canada.

This small island just off the coast of China, has no resources. In 1949 when the Communists took over mainland China, it was little more than a rice paddy field. They started in 1950 with textiles and other simple manufactures. Over the past twenty years they have probably made most of the underwear for the western world, but more importantly, their sophistication increased year by year, and they now make computers and a vast array of complex manufactured products.

Being for the most part refugees they had their problems, but driven by the need for food and employment, they used human energy and ingenuity and they triumphed. Taiwan now has the seventh largest G.N.P. in the world.

Taiwan did not sit back and argue about the quality of life, nor did they engage in fighting over negative income tax, and a thousand other diversions.

Canada, on the other hand, had the Carter Commission on Taxation, followed by the Benson Red Paper, and then finally the new Income Tax Act. The devastation produced by the Tax Act changes is now visible for all to see in the debilitated balance sheets of Canadian Corporations.

The emphasis in Canada has been parasitical -- when you or I work extra hard to produce, or if we find a better way to produce or find a new mine -- our feudal Lord -- our Government comes along to extract an additional pound of flesh and our efforts to develop capital is undermined. Their rationale always appears most virtuous, but the fact is that we are all their slaves.

The siphoning off of money which should properly have been reinvested in our industries has left our economic structure sorely weakened -- no part of it more than the mining industry.

The elimination of the three year tax holiday for new mines, the removal of depletion and the substitution of so-called earned depletion deprive the mining sector of the funds necessary for modernization of existing plants and the finding of new mines so badly needed if we are to have a healthy mineral industry; our industry which was the pride of this country such a short time ago, the pride because of its enterprise, its innovation, its high skills, and productivity.

Social programs which were universal and compulsory were instituted. The old Age Pension, The Canada Pension Plan, free hospital service, universal medical care, and a vast array of other public programs were implemented by Parliament based on the assumption that our country was so wealthy, it could afford any socially desirable program, no matter how expensive, based on the assumption that even in this rich country, you and I were incapable of providing for ourselves. We do need to be protected from some personal catastrophies but what a sham, all we really need for us to provide for ourselves is freedom and to be able to keep most of the income we earn.

The result of the proliferation of government programs was two-fold; first, governments developed an appetite for money totally beyond the wildest imaginings of previous generations and, secondly, the power of decision moved from the private sector, where economic disciplines are always present, to government where only in periods of serious recession does economic reality ever marginally intrude.

During the post war years, the freeing of international trade produced an exponential growth in demand for Canadian products. This annual increase at every level of business activity disguised the fact that the governments were confiscating a growing proportion of the G.N.P. therefore the effect was not immediately discernible. In retrospect, it is starkly apparent that corporations increasingly had to resort to the debt markets for the cash necessary to operate not only their enterprises but also to pay for government mandated non-wealth producing activities.

In consequence, corporate balance sheets are heavily laden with debt. Our major companies are incapable of undertaking new ventures to provide jobs and add to national wealth.

In the early seventies, as the power of government grew, a new pattern emerged, led by Saskatchewan. I remember vividly when a certain Cabinet Minister of that Province, when asked whether or not they intended to nationalize the potash industry, said: "It is not necessary for us to take over the industry, we can accomplish the same thing by taxation". Not many months later, when the provincial treasury was vastly enhanced by unexpected oil revenues and confiscatory mining taxes, the Government of Saskatchewan offered to buy 50% of the existing potash capacity.

The unconscionable taxes which had been levied on potash forced some of the companies to sell and within a few months that government had accomplished its purpose. It is true they did pay a fair price for the companies they bought and, in consequence, there was not the outrage and public protest there would have been had they confiscated without compensation. The money paid to the owners of these mines came from the punitive taxes which had been levied on all the mines stripping the companies of any cash flow. So, in fact, the shareholders of the selling companies simply received funds confiscated from all the potash producers. As you know, Saskatchewan now operates between 50 - 60% of the industry. The secondary effect was that until the recent election, there had been virtually no mineral exploration in that province except for uranium.

In British Columbia, the socialist government which was in power in the early seventies imposed confiscatory taxes on the metal mining industry, and in a few short months, a once flourishing industry was brought to its knees. In B.C. the results were so dramatic there was no hiding the cause from the public, and the outraged miners of the province played a significant role in the defeat of that government.

Even last year, the Federal Government's search for additional funds brought forth the ill-fated MacEachen budget which proposed the introduction of taxes on employee benefits peculiar to northerners. Had it been enacted, the people who now live and work in the North would have decided

that they might as well live more comfortably in the South, and the sparse population of our rich Northern regions would have been seriously depleted. The depletion of the labour supply would, of course, have resulted in ruinous wage escalation.

Only the mines with the richest grades would have continued to operate, and cut off grades would have increased sharply, thereby leaving valuable minerals in the ground and, of course, curtailing the rate of new mine development.

The mind set which produced the cultural shifts in this country, the shift from the work ethic and the honouring of prudence, to a belief in magic, the magic omnipotent wisdom of government and its capacity to meet the expectation of ever-increasing wealth with ever-diminishing effort was inculcated by governments in search of re-election.

This belief in magic which down through the ages has been disproved time and time again, was encouraged by government for devious purposes. As the people became increasingly dependent upon their largesse the power of government increased, and the freedom of the individual diminished. If enough of the wealth created by industry is not left in private hands, economic growth slows until there is not enough to go around. The tax gatherer who now takes far too big a slice thereby forces Canadians to look to government.

Another manifestation of the cultural shift is the growing competition for economic resources between regions of the country, coupled with the calculated encouragement of nationalism and isolationism in a country which had, for years, prided itself in being a leader in international co-operation and the freeing of trade. For domestic control, the old maxim -- divide and conquer-still applies.

And so, in due course, we were blessed with F.I.R.A. an agency to Canadianize industry to encourage the use of our very limited capital resource to buy existing industries, thereby diverting vast sums of money from badly needed economic development.

After the irrational nationalistic fervor had been thoroughly sold to Canadians we were then blessed with Petrocan and the National Energy Program. But for the recession, we would have had Woodcan, Metalcan and God knows how many other "cans". I shall not dwell on the N.E.P. for the fallacies which underly its primary concepts are now abundantly apparent.

The problem with which we are now faced, but which is not yet publicly realized, is how to unwind the mess occasioned by this outrageous parliamentary and bureaucratic interference with the economic system.

First let us remember that this is not just the problem of the oil and gas companies, although energy fuels our economy and affects every part of our industrial and personal lives. The problem now belongs to all of us as we find there is no magic. We must think carefully about what may happen if we do not insist on radical change in the manner in which we are governed.

Turning for a minute to Ontario, where a gold rush is now underway in the Hemlo area; if sufficient new gold production is developed we may well be blessed with a National Gold Policy, which will take from the wealth creators -- from the people who found and developed the properties -- the benefits to which they are rightfully entitled in order to help reduce the colossal deficits which all our governments have created.

Another worrisome development in Ontario were some proposed changes to the Mining Act which, if enacted, would have restricted the right of mining companies to have unfettered access to land surface for the purpose of exploration, and no longer assure clear and unencumbered title to the mineral deposits which they may find below the surface. Ontario is Canada's bell weather province, and if these laws have seen enacted, mining in Canada would have been dealt another devastating blow. It has been most reassuring that these proposed changes are no longer comtemplated.

This tale of woe cannot but remind one of the Kondratieff Curve -- you will recall that the Russian Nikolai Kondratieff postulated that about every fifty-four years, the short, intermediate, and long waves of the business cycle coincided on the down slope producing a depression of catastrophic proportions.

Many of the symptoms which Kondratieff described, are present in our current situation, and 1929 is fifty-four years ago, and if one is inclined to pessimism, a fairly good case could be made for postulating that we are on the verge of an even greater economic collapse.

My view is closer to the oft quoted statement that: "Those who do not read history are doomed to repeat it". We can, if we wish, prove Kondratieff to be right, but I also believe that if we take the lessons of 1981 and 1982 to heart, and mend our ways, our country can be restored to economic health and the sense of pride and optimism which we knew in the fifties and sixties can be regained. If we think this desirable and worthy of achievement, we must insist that the producers of wealth be guaranteed that the benefits of their ingenuity and energy will not be confiscated. We must roll back both the power and size of government, and rekindle pride in self-reliance and independence.

For a period of time, we are going to have to pay higher taxes but we must insist that the additional funds gathered be used to reduce our debt. We must insist that our governments cease printing money, for the lessons of the past show that no nation can debase its currency without also debasing its morality and its economy. During the seventies we debased all three, and by so doing, cast a giant shadow over the future of our land.

You have heard my answer to the first question asked; "What has happened to our country in the last few years, why have we moved from being an optimistic people in a land of unlimited opportunity to a people who no longer have faith in themselves, or their economical and political future".

The second question with which I began was: "What can we do to repair the ravages of the past decade? That, my friends, is in your hands, for if those of us who are closest to the great mineral industry of Canada -- the industry which history clearly shows has been the key economic driving force of this country since its beginnings, must make ourselves heard at every opportunity, on public platforms, at social gatherings, in our own families, and by so doing, we can reverse the destructive forces that have brought us to this present situation, and create a new and vibrant future. Then, at least the last few minutes of the twentieth century will belong to Canada.

SECTION II

WORLD MARKETS AND COMPETITIVENESS

3

An Empirical Approach to the Markets for Non-Renewable Resources

by

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To date, there have been several attempts made to model empirically the behavior of markets for exhaustible resources. Most widely referenced are the studies of Fisher, Cootner, and Bailey (1972) and McNicol (1975). A common shortcoming of these analyses is the failure to incorporate the implications from the burgeoning theoretical literature dealing with non/renewable resources. For example, theoretical models imply a relation between the rates of change of resource prices and the rates of return on other assets. This relation was demonstrated empirically by Heal and Barrow (1980); but has not been introduced into any of the empirical market behavior models.

Hence, our objective is to begin with a simple, tractable model like that used by Fisher et al. and then attempt to incorporate some of the theoretical implications of resource markets into a simple, linear supply-demand model.

In the next section, we provide a brief description of the primary theoretical issues and the resulting empirical model.[1] Then, for the purposes of illustration, we will consider the world copper market. In addition to estimation of our model, we also provide some predictions forthcoming from the model and then compare these predicted values with the actual values.

MODEL SPECIFICATION

In the following, we take as our point of departure the model specified by Fisher et. al. (FCB). As did they, we will use country groups (e.g., Western Europe) as the suppliers and demanders. For each country group we as did they must specify a primary supply function, a secondary (scrap) supply function, and a demand function. Then, for the world market, we specify a single price function. Let us examine these in turn.

Primary Production

In their analysis, FCB used a stock adjustment model and specified desired production to be a function of current price,

$$(Q_t^s)^* = F(P_t) \qquad (1)$$

Unfortunately, this simple specification doesn't reflect some of the most interesting features of the market for non-renewable resources. Let us use the summaries provided by Peterson and Fisher (1977) and Anders et. al. (1980) isolate some of these features and then determine how they could be incorporated.

Most importantly, we must incorporate the dynamic aspects of this market, an issue first raised by Hotelling in 1931. He and others following in his tradition have focused on the

behaviour of output as the resource is depleted. Thus, our model should have a means of reflecting past production. To do this, we elected to incorporate a measure of the remaining deposit defined to be the total deposit (an unknown constant) minus the total extracted in preceding periods, i.e., $TD - \sum_{i=o}^{t-1} Q_i^s$.

Furthermore, as all of the writers have agreed, in this market the firms must maximize present value (or net worth). It follows then that the discount rate--or, as Heal and Borrow used, the rate of return on assets or the interest rate--must be a determinant of current extraction.

Next, we must deal with the uncertainty inherent in the marketplace. Given the length of time necessary to fully adjust to price changes in an extractive firm (i.e., the time necessary to explore for and develop new deposits), we were not satisfied with the FCB partial adjustment specification. Instead, in a manner similar to Stewart (1980), we posit that the firm plans to extract some amount of the deposit, $(Q_t^s)^P$, based on its expectations concerning price and consumption, P_t^e and D_t^e. However, we will want to permit the producers to revise their production plans if their expectations are not realized.

Combining the preceding and adding time as a proxy for technical progress, our interpretation of the existing theoretical literature would yield as a planned primary production function

$$(Q_t^s)^P = f[P_t^e, D_t^e, t, r_t, (TD - \sum_{i}^{t-1} Q_i^s)] \qquad (2)$$

As did FCB, we will use a simple linear form

$$(Q_t^s)^P = (\alpha_0 + \alpha_5 TD) + \alpha_1 P_t^e + \alpha_2 D_t^e + \alpha_3 t + \alpha_4 r_t - \alpha_5 (\sum^{t-1} Q_i^s) \qquad (3)$$

where α_1, α_2, α_3, and α_5 are posited to be positive.

In order to be able to estimate (3), we must specify the manner in which expectations are formed and the relation

between planned and actual production. For price expectations we use the rational expectations approach and specify price expectations to be formed on the basis of past prices and on inventory accumulation in the preceding period (the difference between world primary production and world consumption). That is

$$P_t^e = \frac{\delta_1}{1-(1\delta_1)L} P_{t-1} + \frac{\delta_2}{1-(1-\delta_1)L} (S_{t-1} - D_{t-1}) \quad (4)$$

where L is a one-period log operator, $\delta_1 > 0$, and $\delta_2 < 0$.
For expected world consumption, we use the simpler autoregressive (adaptive) expectations,

$$D_t^e = \frac{\delta_1}{1-(1-\delta_1)L} D_{t-1}$$

For the relation between planned and actual production, we want to permit the producer some latitude in partially revising expectations. Hence, we specify the difference between planned and actual production as

$$Q_t^s - (Q_t^s)^P = \gamma_1 (P_t - P_t^e) + \gamma_2 (D_t - D_t^e) \quad (6)$$

Where $0 \leq \gamma_1, \gamma_2 < 1$.
Incorporating (4), (5), and (6) into (3) our primary production equation becomes

$$\begin{aligned} Q_t^s = {} & \theta_0 + \theta_1 P_t + \theta_2 P_{t-1} + \theta_3 ROWS_{t-1} \\ & + \theta_4 D_t + \theta_5 D_{t-1} + \theta_6 t \\ & + \theta_7 r_t + \theta_8 r_{t-1} \\ & + \theta_9 \sum_{i}^{t-2} Q_i^s + \theta_{10} Q_{t-1}^s \end{aligned} \quad (7)$$

where ROWS represents primary production from all country groups other than the one in question. The parameters of (7) can be defined as follows:

$$\theta_0 = (\alpha_0 + \alpha_5 TD)[1-(1-\delta_1)][\alpha_3(1-\delta_1)]$$

$$\theta_1 = \gamma_1 \geq 0 \qquad \theta_6 = \delta_3\alpha_3$$

$$\theta_2 = \delta_1\alpha_1 - \gamma_1 \qquad \theta_7 = \alpha_4$$

$$\theta_3 = (\alpha_1-\gamma_1)\delta_2 \qquad \theta_8 = \alpha_4(\delta_1-1)$$

$$\theta = \delta_2 \geq 0 \qquad \theta_9 = -\delta_1\alpha_5 < 0$$

$$\theta_5 = \delta_1\alpha_2 - \gamma_2 - (\alpha_1-\gamma_1)\delta_2 \qquad \theta_{10} = 1 - \delta_1 - \alpha_5 + (\alpha_1-\gamma_1)\delta_2$$

Note, however, that, if the producer is unable to adjust planned production to unanticipated price conditions, θ_1 would be zero; so $\theta_2 > 0$ and $\theta_3 < 0$. Likewise, if $\theta_4 = 0$, it follows that $\theta_5 > 0$.

Secondary Production

Continuing to follow FCB, we subdivide scrap production into new scrap -- that created in the fabricating process--and old scrap--that created by the destruction of existing products. This distinction is also emphasized in Page (1977). Following Page, we added the price term to FCB's specification for new scrap recovery to yield[2]

$$\text{Scrap}_t^{NEW} = \alpha_0 + \alpha_1 P_t + \alpha_2 Q_t^D \qquad (8)$$

where Q^D represents consumption of the resource in the country group and α_1 and α_2 are posited to be positive.

As both FCB and Page have suggested, we posit that the production of old scrap is determined by the price of the resource and the amount of the resource available for recovery. Continuing to use a linear specification, this may be expressed as

$$SCRAP_t^{OLD} = \beta_0 + \beta_1 P_t + \beta_2 A_t \qquad (9)$$

resource available for recovery depends on previous consumption in the country group,

$$A_t = \gamma_1 Q^D_{t-1} + \gamma_2 Q^D_{t-2} + \gamma_3 Q^D_{t-3} + \ldots \qquad (10)$$

To obtain total scrap production, we insert (10) into (9) and then add this to (8). As the reader can verify, this will result in an infinite series. Since we do not know a priori the lag structure, we generalize the resulting equation as

$$\begin{aligned} SCRAP_t = {} & \phi_0 + \phi^P_1 P_t + \phi^P_2 P_{t-1} + \phi^P_3 P_{t-2} + \ldots \\ & + \phi^D Q^D + \phi^D_2 Q^D_{t-1} + \phi^D_3 Q^D_{t-2} + \ldots \\ & + \phi_5 SCRAP_{t-1} \end{aligned} \qquad (11)$$

In this specification, parameters of interest may be defined as follows:

$$\phi^P_1 = \alpha_1 + \beta_1 > 0$$

$$\phi^P_2 = -(1-\delta)(\alpha_1+\beta_1) < 0$$

$$\phi^D_1 = \alpha_2 > 0$$

$$\phi_5 = (1-\delta) > 0$$

Demand

In contrast to our specification of the supply function in which we stressed the difference of the supply of a non-renewable resources from a "traditional" commodity, our specification of the demand function follows fairly traditional lines. We will posit that the quantity demanded depends on three determinants:

(1) the price of the commodity in question,
(2) the price of any related commodity, and,
(3) since most of the non-renewable resources are used in the production of durable goods, a measure of income in the country group.[3]

However, like the suppliers, it is quite likely that the demanders of the non-renewable resource may also be unable to adjust instantaneously to changes in the market environment. Hence, we again employ the device of assuming that the demanders make consumption plans based on their expectations concerning prices and income. Continuing to use the simple linear form and imposing homogeneity of degree zero in prices on the demand function, this may be expressed as

$$(Q_t^D)^P = \alpha_0 + \alpha_1 (P_t^e - P_{R,t}^e) + \alpha_2 Y_t^e \qquad (12)$$

where $\alpha_1 < 0$ and $\alpha_2 > 0$.

To obtain an estimable function, we must again specify the manner in which expectations are formed and the relation between planned and actual consumption. For the price of the resource we use precisely the same specification as used for primary production,[4]

$$P_t^e = \frac{\delta_1}{1-(1-\delta_1)L} P_{t-1} + \frac{\delta_2}{1-(1-\delta_1)L} (S_{t-1} - D_{t-1}) \qquad (13)$$

For expected income, we continue to use rational expectations and posit that income expectations are based on the historical trend in income and on the rate of capital accumulation and the rate of growth of the money supply,

$$Y_t^e = \frac{\delta_1}{1-(1-\delta_1)L} Y_{t-1} + \frac{\delta_3}{1-(1-\delta_1)L} \dot{K}_{t-1} + \frac{\delta_4}{1-(1-\delta_1)L} \dot{M}_{t-1} \qquad (14)$$

In (14), we expect for δ_1, δ_3, and δ_4 to all be positive. In the case of the price of any related commodity, we use the simpler adaptive expectations,

$$P_{R,t}^e = \frac{\delta_1}{1-(1-\delta_1)L} P_{R,t-1} \qquad (15)$$

In order to permit the demanders to partially revise their consumption plans if their expectations are not realized, we specify the relation between planned and actual consumption as

$$Q^D_t - (Q^D_t)^P = \gamma_1[(P_t - P_{R,t}) - (P^e_t - P^e_{R,t})] + \gamma_2(Y_{t-} - Y^e_t) \quad (16)$$

where $\gamma_1 \leq 0$ and $\gamma_2 \geq 0$.

Incorporating (13) - (16)[5] into (12), our final specification of the demand function is

$$Q^D_t = \psi_0 + \psi_1(P_t - P_{R,t}) + \psi_2(P_{t-1} - P_{R,t-1}) + \psi_3(S_{t-1} - D_{t-1}) \quad (17)$$
$$+ \psi_4 Y_t + \psi_5 Y_{t-1} + \psi_6 \dot{K}_{t-1} + \psi_7 \dot{M}_{t-1} + \psi_8 QD_{t-1}$$

where the relation of the parameters of (17) to the underlying parameters is as follows:

$$\psi_0 = \alpha_0[1-(1-\delta_1)]$$

$$\psi_1 = \gamma_1 < 0 \qquad \psi_5 = (\alpha_2-\gamma_2)\delta_1$$

$$\psi_2 = (\alpha_1-\gamma_1)\delta_1 \qquad \psi_6 = (\alpha_2-\gamma_2)\delta_3$$

$$\psi_3 = (\alpha_1-\gamma_1)\delta_2 \qquad \psi_7 = (\alpha_2-\gamma_2)\delta_4$$

$$\psi_4 = \gamma_2 > 0 \qquad \psi_8 = 1-\delta_1 > 0$$

Note that, if the demanders are unable to adjust to unanticipated prices, $\gamma_1 = 0$ and it follows that $\psi_2 < 0$ and $\psi_3 > 0$. Likewise, if $\gamma_2 = 0$, ψ_5, ψ_6, and ψ_7 would all be positive.

Price

In the preceding subsections our discussion has concentrated on the dynamic aspects of the market for a non-renewable resource. In the context of the supply and demand functions formulated, an equilibrium would exist only if the suppliers' and demanders' expectations were simultaneously realized. That is, an equilibrium would exist only if planned and actual production and consumption were equal. If this were the case, it would be a simple matter to sum total production and total consumption over the country groups and then equate world production and world consumption to yield the equilibrium price. As the reader can verify, this would result in a reduced-form equation of the form

$$P_t^* = f[P_{t-1}, (S_{t-1}-D_{t-1}), t, r_t, \sum_{i=0}^{t-2} S_I, SCRAP_{t-1}, P_{R,t}, Y_t] \quad (18)$$

In our model, we do not propose that this equilibrium is necessarily realized. Instead, we assume that the actual, observed price tends toward the equilibrium price as[6]

$$P_t - P_{t-1} = \delta(P_t^* - P_{t-1}) \quad (19)$$

where $0 < \delta < 1$.

Then, using a linear form for (18) with (19), it follows that we can specify the reduced form equation for actual price as

$$\begin{aligned} P_t = {} & \eta_0 + \eta_1 P_{t-1} + \eta_2 (S_{t-1}-D_{t-1}) + \eta_3 t \\ & + \eta_4 r_t + \eta_5 \sum_{i}^{t-2} S_i + \eta_6 SCRAP_{t-1} \\ & + \eta_7 P_{R,t} + \eta_8 Y_t \end{aligned} \quad (20)$$

Clearly, the parameters η_i are nonlinear combinations of the underlying parameters. We intent to make no hypotheses concerning signs in this equation.

Instead, our objective was to be able to specify a reduced-form equation that conforms to the dynamic supply and demand functions we have employed.

AN ILLUSTRATION--THE WORLD COPPER MARKET

In order to ascertain the applicability of the simple model we have proposed, permit us to present some results for the world copper market. We divided the world[7] into seven country groups:

(1) North America
(2) South America, Central America, and the Caribbean
(3) Asia
(4) Africa
(5) Western Europe
(6) Oceania
(7) Centrally Planned Economies

Estimates of the primary production, secondary production, and consumption equations and a single price equation were obtained for the period 1952-79. Then, these estimates were used to obtain in-sample forecasts of production, consumption, and price for 1965-79. By comparing the actual and predicted values, we can then get some judgement of the performance of the model as an integral whole.

Data

Data were required by country group for primary and secondary production and consumption, as well as the world price of copper and the related commodity. (We use aluminum as the related commodity.) Furthermore, data were required on characteristics of the country groups--i.e., income, rate of capital accumulation, interest rate, and rate of growth of the money supply.

All of the mineral data were collected from Mineral Statistics. For primary production, we used mine production in thousand metric tons. Data for secondary production (scrap recovery in thousand metric tons) were available only for North America, South America, Asia, Europe, and Oceania. Consumption data were available only for refined copper, again measured in thousand metric tons. For the world price of copper, we used the London Metal Exchange (LME) price for electrolytic copper wirebars. (While we acknowledge the difficulties introduced by the two-market system that has existed,[8] we feel that this price more accurately reflects a market determined price.) The LME price in pounds Sterling per long ton was converted into U.S. cents per pound and deflated by the U.S. wholesale price index (1967 - 100). The world price of aluminum was defined to be the U.S. price for 99.5% aluminum ingots in cents per pound deflated by the U.S. wholesale price index.

Data on income and capital accumulation were obtained from the United Nations Statistical Yearbook. For income, we used the "index of per capita gross domestic product." To

reflect the rate of capital accumulation, we used the rate of change in the "index of gross fixed capital formation." (Data were not available for the centrally planned economics and was available only after 1959 for South America, Asia, and Africa.)

Interest rate data was available only for North America, Europe, and Oceania. We obtained our measure of the interest rate in the country group by calculating the weighted sums of the yields of long-term government bonds for the major countries in the group, obtained from International Financial Statistics. The countries considered were the United States and Canada for North America; Great Britain, France, and West Germany for Europe; and Australia and New Zealand for Oceania. The weights applied to specific countries were calculated as the five-year averages of the ratio of the gross domestic product of the country to the total gross domestic product of the group,[9] where all data were converted to U.S. dollars.

The rates of growth of the money supply in North America, Europe, and Oceania were calculated in the same manner as the interest rates. We obtained an index of money growth rates for individual countries from International Financial Statistics and then calculated the weighted average rate for the country group.[10]

Estimation Techniques

The estimating equations incorporate endogenous variables as explanatory variables, including not only lagged values (e.g., Q^{S}_{t-1}) but also current values (e.g., P_t). Since ordinary least squares estimation would result in biased estimates of the coefficients, we used two-stage least squares treating the lagged endogenous variables as predetermined (i.e., exogenous) variables.

Using the two-stage least squares estimation techniques, all of the exogenous (and predetermined) variables relevant for the market should be used as instrumental variables. In some instances the period over which we have data for a country group was simply too short to use all of the variables as instruments. In such cases, we were required to reduce the number of instrumental variables, concentrating on those variables which, theoretically, are the more significant determinants of the included endogenous variables.

We should also note that we treated the prices of related commodities as exogenous variables. Although it might be more appropriate to treat them as endogenous variables, such a procedure would require the incorporation of the simultaneity of the individual mineral markets (e.g, the copper and aluminum markets would be estimated simultaneously). Such a procedure was simply beyond the scope of this analysis.

Note that the proposed two-stage least squares estimation technique would be appropriate only if there exists no serial correlation in the error term. In their study of the copper market, FCB hypothesized that autocorrelation may well be present. Since the simple Durbin-Watson statistic is biased in the presence of lagged endogenous variables, we employed the method suggested by Hatanaka (1974) to test for this autocorrelation. In no case did we find serial correlation to be statistically significant.

Finally, in the estimation of the individual equations, several dummy variables were used. In the case of primary production in Oceania, the data exhibits a "stair-step" pattern. We viewed this as a reflection of new production coming on line; so, we employed four dummy variables to reflect the increases in production in 1953, 1958, 1969, 1972, and 1973. In the case of consumption, the only dummy variables used were employed to account for the severe decline in consumption associated with the recession of 1975-76. Such dummies were used in the equations for North America, Asia, Africa, Europe, and Oceania. In the price equation, we used a dummy variable for the period 1964-1974. With the data available to us, we were not able to explain (in the econometric sense) the substantial increase in real price over this period.

Empirical Results

In all, the copper model is made up of 20 equations: Seven primary production equations, five secondary production equations (scrap data were not available for Africa or the centrally planned economies), seven consumption equations, and the price equation. We first estimated each of these functions as specified in equations (7), (11), (17), and (20) above and then combined them into a system of simultaneous equations. However, the in-sample predictions we obtained from that system were not satisfactory. While each equation was independently satisfactory, when they were combined to form a system, the predictions generated were not satisfactory in the sense of accurately predicting past behaviour.

The reason for this problem is that the equations are estimated independently, while the forecasts are obtained by combining these equations into a system. Hence, a specification error in one equation is fed into the other 19 equations and, in the process, the error can be compounded.

Hence, we tried alternative specifications of the equations with two criteria in mind: (1) Keeping the basic spirit of our dynamic-disequilibrium model intact and (2) maximizing the precision of the in-sample predictions. While this procedure does employ the actual values of the exogenous variables for the period 1965-1979, it is not simply an in-sample prediction that one would normally think of (e.g., in order to obtain residuals). In addition to the exogenous

variables, the model also requires past values of the endogenous variables. These values are not supplied. Instead, the model uses its predictions. Hence, the best way to view the in-sample predictions is to suppose that in 1964 one knew the past values of all the variables and the future values of the exogenous variable. If my input data were accurate, how well could I have predicted the "future" values of production, consumption, and price?

Based on the criteria set forth above, the estimated coefficients used in the simulation equations for primary production, secondary production and consumption are as displayed in the following tables. The reader may wish to compare these specifications with those embodied in equations (7), (11), and (17). The price equation was perhaps the one that was most radically altered. The variables t, $\sum_{i}^{t-2} S_i$, P_{t-1}, R_t, and Y_t were eliminated and the lagged scrap value was incorporated into the lagged inventory term. The final equation, with its estimated coefficients is as follows:

SIMULATION EQUATIONS - PRIMARY PRODUCTION

VARIABLE	NA	SA	AS-1	AF-1	EU-1	OC-1	CP-1
CONSTANT	-1618.7431	138.9997	126.3457	-124.6510	-10.4089	307.2846	-302.0119
P_t	1.7505	1.1722	.	2.0266	.	.	.
P_{t-1}	8.0598	-2.9267	0.7445	-0.6906	0.3425	.	1.0004
$ROWS_{t-1}$	0.8980	.	0.0303	-0.0297	.	0.0011	.
D_t	0.4173	.	0.0253	.	0.0106	0.0024	.
D_{t-1}	-0.4148	.	0.0344	.	-0.0108	0.0031	.
t	13.3183	2.5541	-2.8689	3.8813	.	.	5.9124
$\sum_{i}^{t-2} Q_i^s$	-0.0886	0.0202	0.0134	.	.	.	-0.0009
Q_{t-1}^s	0.5139	0.5079	0.6643	0.9612	0.9811	0.1197	0.9256

SIMULATION EQUATIONS - SECONDARY PRODUCTION

VARIABLE	NA-1	SA-1	AS	EU-1	OC-1
CONSTANT	-53.3241	-28.3050	5.3962	-89.9339	-17.8776
P_t	2.6029	0.3127	0.5242	3.0153	0.0083
P_{t-1}	2.7575	0.1142	-0.2841	-0.1230	0.0600
P_{t-2}	.	.	.	.	0.3805
Q^D_t	0.0614	0.1205	0.0559	0.0697	0.3343
Q^D_{t-1}	0.0441	-0.1214	0.0216	-0.0529	0.2087
Q^D_{t-2}	-0.0123	0.0566	-0.0126	0.0660	-0.2902
Q^D_{t-3}	.	.	.	.	-0.0175
$SCRAP_{t-1}$	0.6844	0.8098	0.2315	0.4694	.

SIMULATION EQUATIONS - CONSUMPTION

VARIABLE	NA	SA-1	AS-1	AF-1	EU-1	OC-1	CP
CONSTANT	86.0780	-242.9327	-514.7057	-32.4033	27.4124	-25.3896	38.6775
$P_t - P_{r,t}$	.	.	.	.	.	.	
$P_{t-1} - P_{R,t-1}$	.	-0.5409	-1.1146		-4.6775	-0.1386	.
$P_{t-2} - P_{R,t-2}$	-0.3211	.			.	.	.
$S_{t-1}, -D_{t-1}$	.	0.0063	.	.	0.0061	.	.
Y_t	5550.4414	1115.7820	1874.5602	.	443.3079	-0.0033	0.0074
Y_{t-1}	-4697.8888	-697.0972	-561.2801	47.4345	1679.5866	-384.6115	.
K_{t-1}	.	83.3715	1367.6544		2238.5562	62.9920	.
M_{t-1}	.	.	.	.	-6.7000	0.1095	.
Q^D_{T-1}	0.4945	0.1055	-0.1079	0.8454	0.3122	0.5935	0.8277

$$P_t = 31.7104 + 0.3950\ P_{t-1} - 0.2602\ P_{t-2} - 0.0016\ (S_{t-1} + SCRAP_{t-1} - D_{t-1}) - 0.4522 r_t .$$

Using the equations presented (as well as the dummy variables noted earlier) the relation between predicted and actual values for primary production, secondary production, consumption, and price (in 1979 U.S. dollars) is displayed in the following figures. For a more precise evaluation of the in-sample forecasts, we calculated mean error, mean percentage error, root mean error, and root mean squared percentage error for consumption for each country group (e.g., CNA), primary production of each country group (e.g., PCP), world scrap production (SCR), world consumption (CWRLD), world primary production (PWRLD), and price (PRICE). These values are displayed following the figures.

EVALUATION OF IN-SAMPLE PREDICTIONS

FUNCTION	ME	MPE	RMSE	RMSPE
CNA	-42.324	-0.017932	152.441	0.068475
CSA	0.945	0.016413	18.976	0.103630
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CAF	4.093	0.123915	10.717	0.235019
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COC	-1.294	-0.010688	7.093	0.059458
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PSA	-20.418	-0.014484	63.357	0.054862
PAS	-3.952	-0.000431	20.405	0.049268
PAF	-57.337	-0.038799	90.575	0.061809
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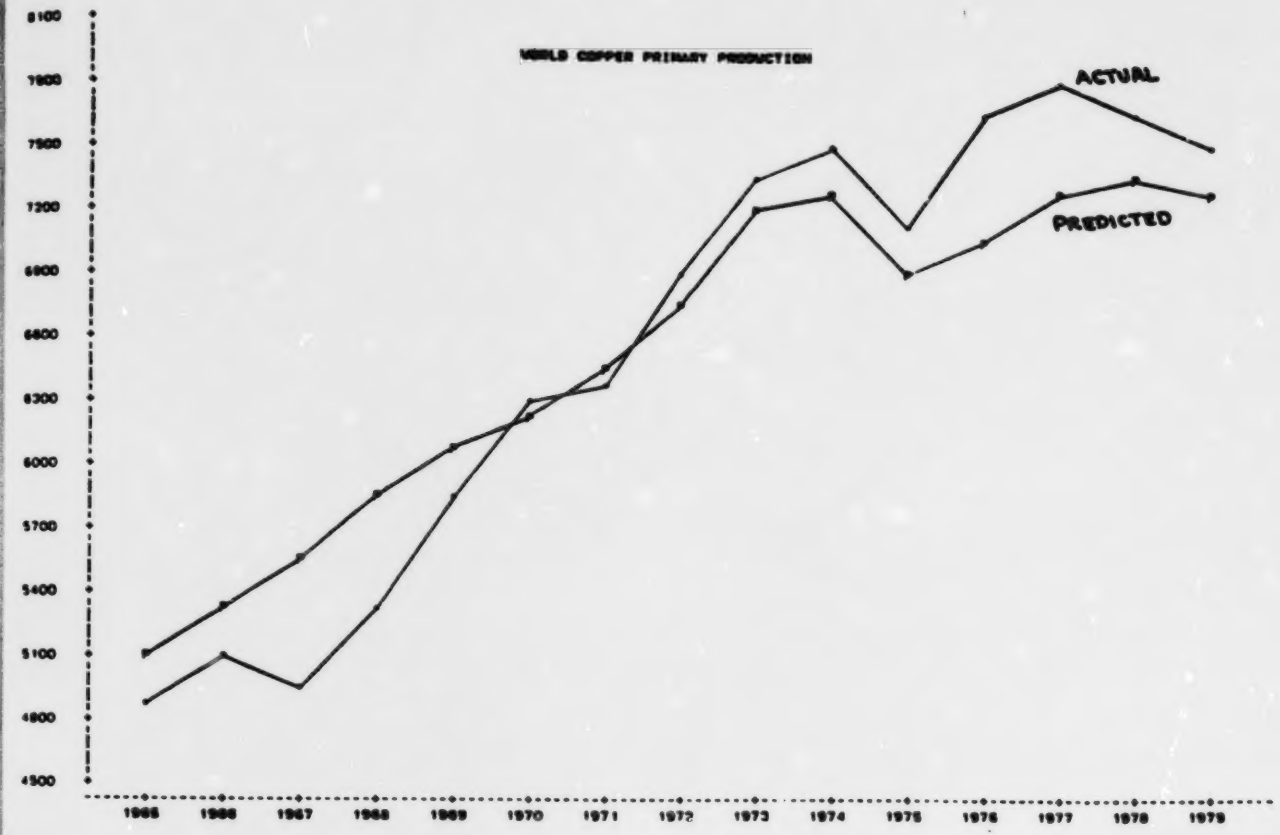
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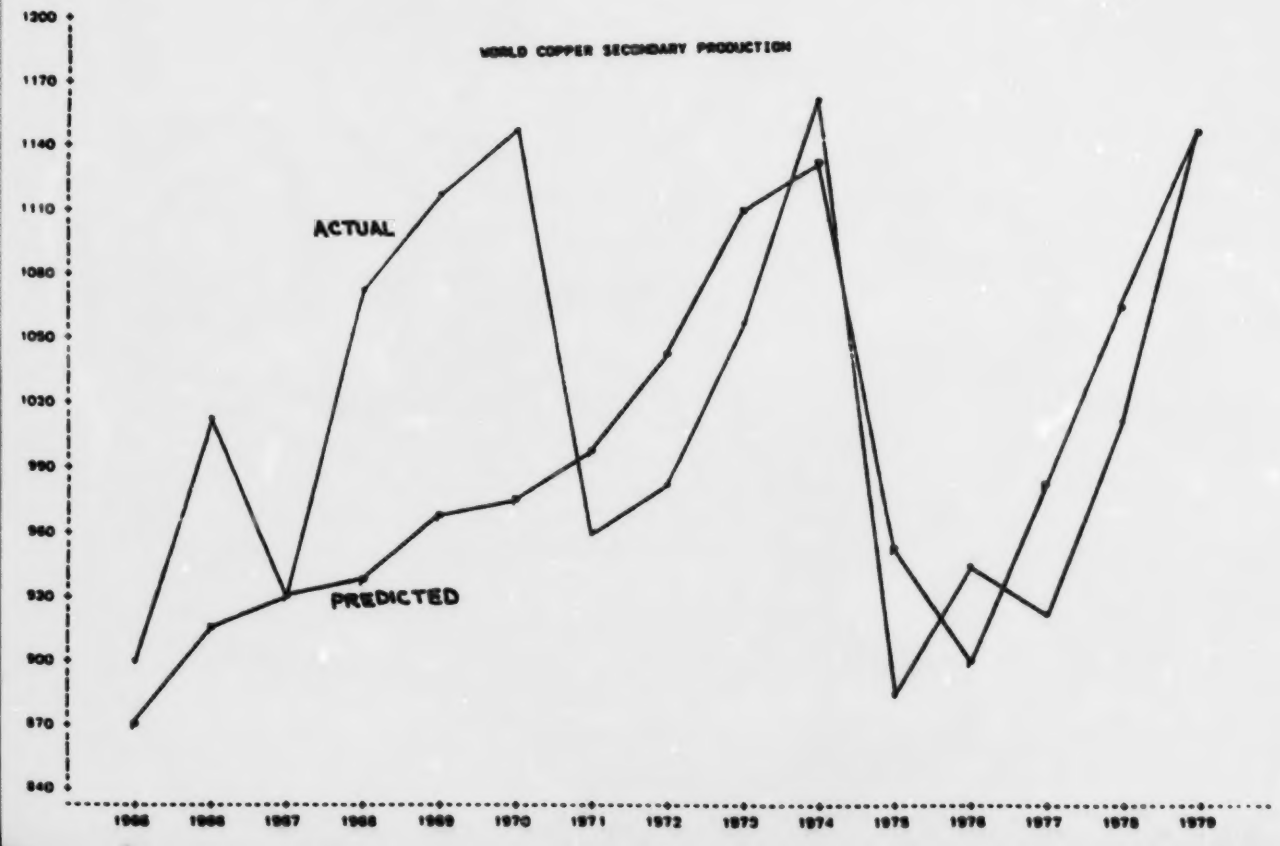
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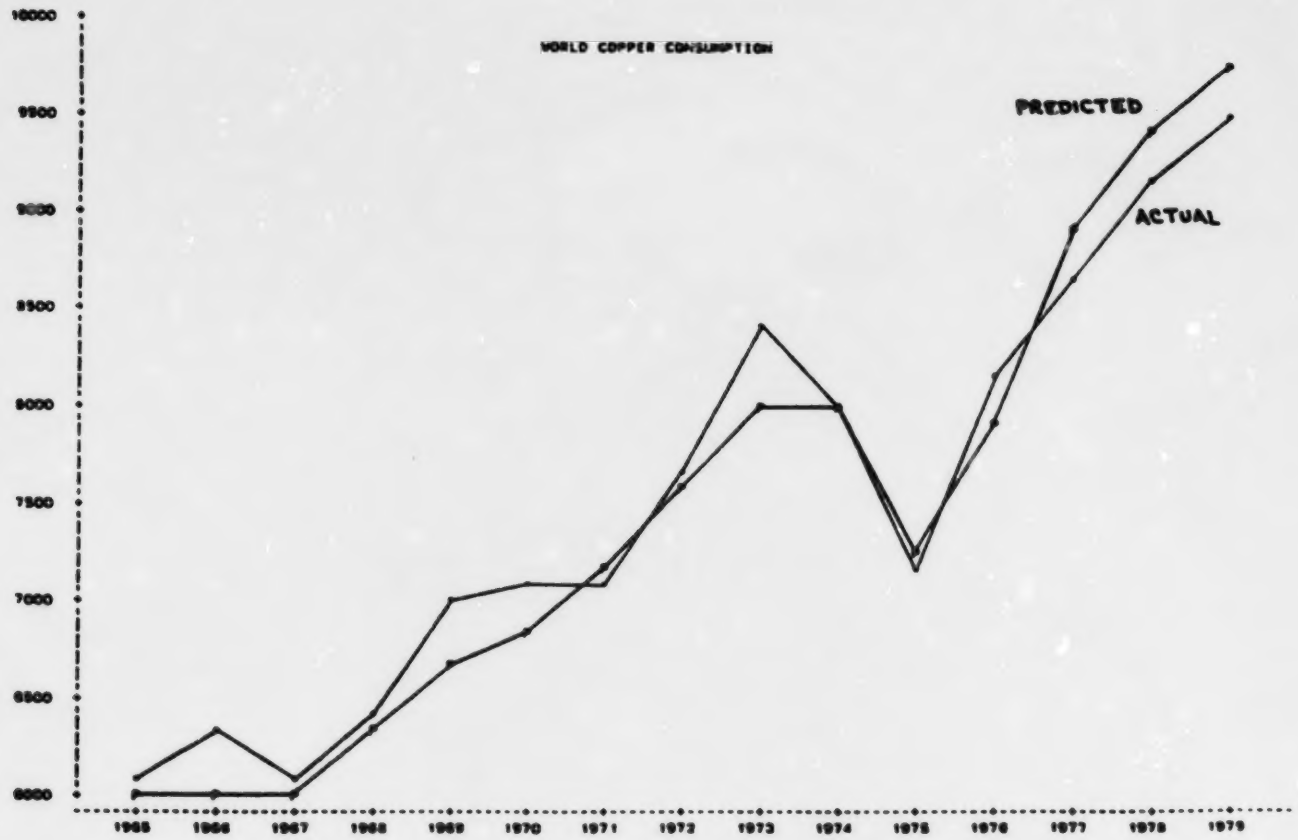
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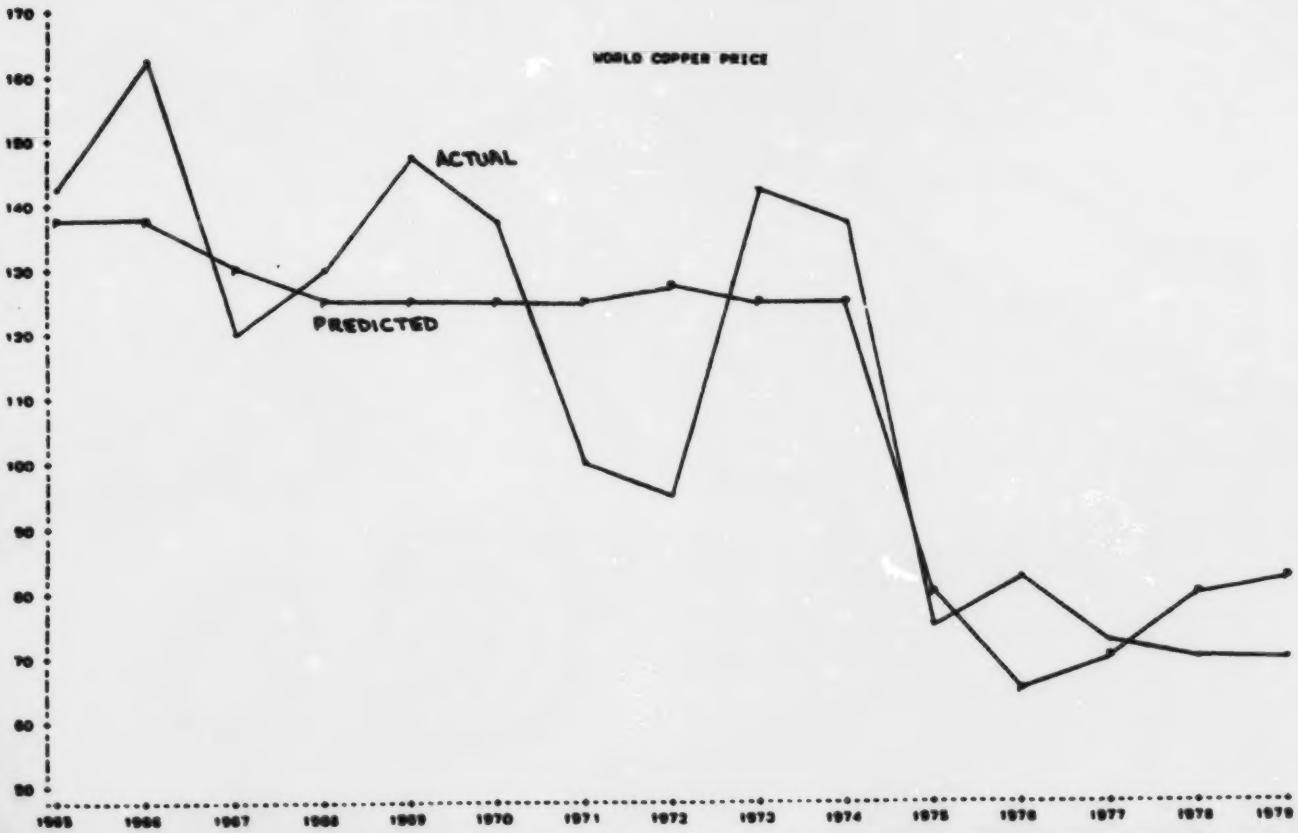
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FOOTNOTES

*This research project was supported by the Ontario Ministry of Natural Resources. We gratefully acknowledge the support and assistance provided by personnel at the Ministry, particularly Gerhard Anders.

A more complete description of the empirical model can be found in Smithson et al. (1981).

While we agree with Page (1977) that the scrap price may not be identical to the primary price, reliable data are generally not available for scrap price; so, we will use the same price for both production sectors.

The issue of durability was central to the discussion in Stewart (1980).

This does not, however, imply that the suppliers and demanders have the same price expectations-- and are not necessarily equal in equations (4) and (13).

Note the similarity between this specification and that suggested by Stewart (1980). His inverse demand function was of the form

$$P_t = F\left(\sum_{i=1}^{t} Q_i\right)$$

while our demand function takes the general form

$$Q_t = f(P_t, P_{t-1}, \ldots)$$

This formulation differs from the type of disequilibrium specification proposed by Fair and Jaffee (1972); but, the dynamic price-adjustment flavor is retained. Fair and Jaffee postulated that price changes are determined by excess demand in the market,

$$P_t = f(D_t - S_t)$$

where F is a positive function with $f' > 0$. In our specification

$$P_t = f(P_t^* - P_{t-1}),$$

excess demand will lead to an increase in P* which in turn will lead to an increase in P, since f is again a positive function.

Footnotes (con't)

Data were not available for China, North Korea, and North Viet-nam; so, these countries were excluded.

See Banks (1974) and Fisher, Cootner, and Bailey (1972).

The interest rates for West Germany were not available prior to 1956. In order to approximate these rates, we used a regression interpolation. We found the most satisfactory fit to be that using the discount rate (DIS) as the explanatory variable. The following regression equation was estimated for 1956-1977 and used to obtain interest rates for 1947-1955.

$$r_t^{\text{Germany}} = 1.913 + 0.561\ DIS_t + 0.488\ DIS_{t-1} + 0.284\ DIS_{t-2}$$

$$R = 0.84$$

While we could have simply used the weighted average for Great Britain and France for the period 1947-1955, we noted that the German interest rates are generally much higher than the other two in the early part of our sample. Consequently, if we used only the weighted average for Great Britain and France, the resulting series would show a large jump between 1955 and 1956 (when German data becomes available).

In this case, data for the money supply in West Germany were unavailable prior to 1949. Rather than employ a regression interpolation, we simply used the weighted average for Great Britain and France only for the first two years.

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4

STRUCTURE, INTERPRETATION AND IMPLICATIONS OF ONTARIO'S MINERAL MARKET FORECASTING MODEL

by

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Introduction

The current program of the Ontario Ministry of Natural Resources in mineral economics and mineral markets modelling goes back to 1973, the year the current Mineral Resources Branch was formed. Prior to the early 1970s mining and mineral development in Ontario and elsewhere in Canada were pretty well left alone by government. At that time government intervention in the mineral sectors and in other sectors of the economy began to accelerate. In Ontario concern grew over the implications as to the mineral sector's health of the effects of such interventions.

The cause of this policy shift may well be related to the pattern in the growth of the Canadian money supply and in the various price indices that came to emerge with the usual one to two year lags in the late '60s and early '70s. The money supply had started to accelerate faster than its hitherto normal rate about a year after Pearson took office and really began to skyrocket after Trudeau came to power. The consumer price index had started to accelerate in 1965, really started to take off in 1972, the second year after the beginning explosion in the money supply (Fig 1).* These two indicators, which may be related to a number of other policy initiatives that characterized the beginning of the decade of the 1970s, together with developments in world mineral markets set in train much increased work on specific mineral policy developments, both on the Provincial and the federal level.

Mineral policy work in Ontario started with the realization that the impacts that affect the fortunes of the mining industry are of two types:
Direct - primarily changes in world market factors such as supply, demand and price and,
Indirect - the impacts of policy factors, which could be of foreign or of internal origin.
Our work in mineral policy research started with the investigation of some policy factors of immediate Provincial concern, but it was soon realized that projections of impact of policy changes alone were of little use, they had to be viewed and interpreted in conjunction with projections of the impact of market related factors.

Development of the Model

The current program of mineral markets analysis started with some reservations in the early 1970s about the then conventional approach to world nickel consumption data series. This consisted essentially of a simple log-linear regression which yielded, using data beginning in 1945, an approximately 6% per annum compound growth rate in consumption. This would require in the year 2000 more than 2.5 million metric tons of nickel production or more than

* The figures referred to in this paper are located at the end of the volume.

twice the capacity estimated to be in place in 1980. We saw a different growth pattern: flat from 1945 to the late 50s, very steep from the late 50s to the mid 60s and then a flattening out again. If the steep portion was unusual and the flat ones represented normalcy, a year 2000 production capacity not significantly exceeding the capacity then estimated to be in place by 1980 in the 1.1 to 1.2 million metric ton range would be required.

The economic explanations for the unusually rapid growth in consumption during the middle period we considered to be firstly, post war catch-up in living standards in parts of the western world and of Japan to North American levels, a process that would have to come to a halt soon and, secondly, inflationary over-expansion of metal using primary industry sectors as explained by Austrian cyclical theory. This of course had to come to an end too. We did not think that the great faith held onto by some in rapid economic growth of vast areas of the so-called Third World, as well as of the Communist Bloc would materialize, due to systemic constraints.

When it became plain that similar growth patterns were exhibited by copper and zinc, we felt that a more formalized, quantitative approach to this problem should be tried. It was decided to embark upon the development of a simulation model, which would be able to capture the key variables which we considered to be significant in the economic explanation of our forecasts. In addition to incorporating the considerations mentioned above, this model would have to be in line with modern thinking on the role of expectations in economic decision making, would have to incorporate the concept of tendency toward market equilibrium in any given time period rather than the reaching of an equilibrium in every time period, and would lastly have to allow the simulation of scenarios in which a great many factors could be changed to test the sensitivity of the relevant metal markets to expected changes according to the economic or political judgement of the user.

As far as the Ministry is concerned this modelling is part of a comprehensive package of policy analysis work encompassing commodity studies, topical studies, legislative analysis and other fields. It is readily conceded that the model may not fully satisfy the requirements of other users, but it does more than adequately satisfy the policy analytical requirements of the Ministry when used and interpreted in conjunction with judgements and opinions of the various other members of the staff, who are experienced professionals in mining, metallurgy, business administration, sales, trading, geology and financial analysis.

The Structure

While conventional techniques of trend analysis have the advantage of simplicity, they do not allow an analysis of underlying market structure nor do they allow to examine the results of changes in any of the important variables that affect the market structure. Our analysis explicitly incorporates a supply-demand framework for the markets under consideration and recognizes the inherently dynamic nature of mineral markets as well as the fact that a market clearing equilibrium may not occur. It allows to consider the effect of changes in the economic environment, as well as changes in political or technological conditions.

Our work along these lines concentrates on four major metals: copper, aluminum, nickel and zinc. The first necessity was a definition of the suppliers and demanders. On a world market these could have been countries, but the number of countries involved made this impractical. Consequently suppliers and demanders were defined as country groups. Using a criterion of minimizing the number of groups while maintaining internal consistency, seven country groups were settled on: 1. North America, 2. Central and South America, 3. Asia,4. Africa, 5. Europe, 6. Oceania, 7. Centrally Planned Economies. A number of Eastern Bloc countries for which virtually no data were available were excluded. For each of the country groups primary supply, secondary supply and demand functions were developed as well as a single price equation, as the mineral commodities are traded on world markets.

In developing the primary production function the following considerations had to be kept in mind to reflect the dynamic nature of the market:

1. Since known and developed orebodies are depletable, current extraction depends on the amount previously extracted. Increases in ore deposits through exploration and technological development re-enter through the time variable.
2. The interest rate becomes a determinant as firms must maximize profit over time.
3. Adjustments in production plans do take a lot of time, producers make their plans on the basis of expectations about future price and future consumption levels.
4. There has to be provision for a partial adjustment of production plans if expectations are not realized.

Planned primary production thus is a function of expected price, expected consumption, the amount previously extracted, time and the interest rate. A rational expectations approach in the formation of these expectations is applied and actual primary production is lastly specified to allow for partial adjustment of production plans. The details of the primary supply function are given in Fig. 2.

Secondary production consists of new and old scrap production, both of which depend on the price of the mineral. New scrap production also depends on current consumption and old scrap production on the amounts available for recovery, that is past consumption. Secondary production is specified as a function of the price and of consumption of the mineral in current and past periods. The details are given in Fig. 3.

Demand for metal commodities is a derived demand as they are used as inputs into other production processes. Quantity demanded is a function of the price of the mineral, the price of substitute or complementary inputs and - as a proxy for demand for final commodities - income in the country groups. Consumers, much like suppliers, are usually unable to adjust instantaneously to market changes and therefore again, a combination of rational and adaptive expectation approaches is used. Details are given in Fig. 4.

With given supply and demand functions the world equilibrium would require that all expectations are realized. In that case the aggregated supply and demand functions could be solved simultaneously for a market clearing price. We do not require attainment of such an equilibrium. Disequilibrium is allowed for and it is assumed only that the actual price tends towards the unobservable equilibrium price. In the price equation arrived at, price is a function of all of the variables in the system. Details of the price equation are given in Fig. 5.

The econometric equations are used to generate projections of the future values for primary production, secondary production, consumption and price. The techniques used are a combination of iterative and extrapolative approaches. Past historical data are used, but are not sole determinants of the future values of the respective variables.

The simulation model first provides a base simulation in which the endogenous variables are determined under the assumption that all exogenous variables follow trend. For the nickel market, a modified base simulation has been developed in which it is assumed that the nickel market, historical data for which still primarily reflect Inco's price leadership position, becomes more competitive. This was done by imposing some structural characteristics of the copper market. At present an alternative modified base simulation for the nickel market is being developed employing different statistical estimation techniques.

A problem that may be cited is that in many scenarios, cumulative positive differences between production and consumption are allowed to grow without constraint. While it would be possible to impose such limitations, which would feed back to constrain production, as functions of such factors as annual consumption and the interest rate, the

detailed mechanics of such limitations would have introduced new complexities. While further work along these lines may be undertaken in future, for the present this problem can be handled fairly simply by developing scenarios incorporating selected production cutbacks in form of external shocks.

If the user assumes that for whatever reasons, growth rates of exogenous variables, either world wide or for specific country groups, are not going to follow historical trends, that is that the base simulations are unlikely to apply, specified alternative growth rates for income, interest rate, capital accumulation, money supply and price of related commodity can be plugged in. If it is felt that for some political reason, e.g. political events in Africa or South America, or changes in economic plans in the Soviet Bloc, such change will be imposed upon the endogenous variables, primary production, secondary production, consumption or price, such "external shocks" to the system can also be accommodated in the creation of alternative scenarios.

Lastly, the effect of the entry of new sources of supply, demand or both into a specific mineral market can be simulated by introducing a new "country group". Examples here would be the simulation of alternative assumptions as to the effects of the entry of Red China in a major way into world mineral markets or the impact of a beginning of seabed mining. For this to be done the user has to specify for the new country group the beginning year and initial levels of consumption, production or both and their annual growth rates. These simulation features allow that a very wide range of changes can be experimented with to analysize the impact of such changes in isolation or in combination with one another.

Interpretation

Computer printouts of the results of model studies are never forecasts and the printouts from our model are no exception. To move from printouts to forecast, a number of intermediate steps are necessary. The first, is to bracket, by chosing appropriate scenarios, the range of events considered to be most likely to happen. In this way simulation scenarios are generated to test the sensitivity of world markets, and particularly western market sectors, to specific changes in exogenous variables. Our own forecasts are arrived at by discussing the results of a range of most likely simulation scenarios among the various members of the Ministry's policy team. This requires on the practical side thorough knowledge of the mining, metallurgical and use related technical factors, as well as of pertinent trading and marketing aspects world wide, and on the theoretical side an ability to bring the principles of analysis of Austrian economics, of monetarist economics, of the economics of knowledge and of comparative systems, as well as of political philosophy, to bear on the assessment

of most likely future developments within the various country groupings involved. The second set of references cited at the end of the paper constitute, in our view, the absolute minimum in theoretical knowledge with which the practical man engaging in such interpretation should be conversant.

To illustrate the problems of selecting the limited number of scenarios which would in our opinion, be most likely to really happen, let me discuss why we have in the recent past stressed the importance of scenarios which lie generally somewhat below the base scenario. This arises from the perception that we are at the end of a major cycle of unanticipated inflation in the western worl. If we felt that we were at the beginning of such a cycle we would choose base scenarios well above trend. In modifying base secenarios for Third World dominated country goups, we go below trend on the basis of our assessment of the balance of their policies among wealth creating and wealth redistributing ones coupled with considerations of levels of indebtedness as they would affect future borrowing capacity and assessments of political stability. In looking at the Communist Bloc countries we would again choose very low growth scenarios. On balance we would take the view that neither the Third World or the Communist Bloc countries are ever likely to exceed by much, 1% or at the very best 2% real growth over the long run due to systemic constraints. In the case of the Soviet Union and some other Eastern European coutries we would have to consider the possibility of no growth or slight negative growth rate for several years in the future, but we would have to take into account the possibility of an increase in production of minerals for export. In the developed Western countries we would by and large take the view that overall real economic growth rates, much in excess of 2% to 3% per year cannot be sustained for any length of time without accellerating inflation and today no longer even with inflation. While we would consider it most likely that Western Europe and Japan for instance would perform somewhat on the lower side of these long run expectations, we would see a distinct possibility of the U.S. economy performing in the 3% or even slightly higher range during the late '80s.

All this is based on rather comprehensive monitoring of economic and political developments and not on casual reading of a few papers and popular magazines. It is intended just to illustrate the kinds of general economic considerations that have to be brought to bear in the development of forecasts and they are certainly modified by specific technical information impinging on world mineral market developments.

As to ongoing operation of our computer simulation model our work published in detail so far only intended to demonstrate the viability of a principle of analysis, although the model provided us internally with much important background.

Continued operation does require rather constant work on the model on a fairly high technical level. Unless the user is willing to employ an econometrician/computer programmer to engage in constant updating of data series (and some of the major data series employed are revised every year to a significant extent), recalculation of constants, refinements in estimating techniques and generation and comparison of large numbers of alternative scenarios in collaboration with other professional staff, in-house operation of the model should probably not be undertaken.

Implications

The over-riding factor in the outlook for the base metals most important for Ontario, nickel, copper and zinc, will be the response of world markets to the changing secular demand pattern, specifically the flattening of consumption growth trends, that began to be discernible in the mid to late'70s. This, given the capacity over-expansion of those years and the possibly much increasing competition for sales by Communist Bloc and some Third World producers, portends as a most likely price response a return to the secular declining trends in real terms. Of importance to Canada will be increasing U.S. concern over so called "resource war" issues, that is over assured supplies of strategic metals, "assured" here connoting secure against political manipulation by adversaries or their proxies as well as against interruption during armed conflict.

In nickel, we would expect for the first half of the coming decade,consumption growth rates in the .5% to 1.5% per year range at best, this may in the second half of the decade increase to a slightly better 2% to 3% in real terms, but only if solid non-inflationary growth is resumed over most of the industrialized Western world. This implies the need for a total level of reduction in world wide installed capacity from current levels in the range of 20% to 30%, and possibly more if allowances have to be made for capacity additons. Differently put, worldwide nickel consumption growth rates would have to be plus 5% per year, compounded from the 1982 base to bring total consumption up against nominal 1980 capacity limits by the year 1990; to reach that limit by the year 2000 a compound growth rate of 2.5% would be required. Such rates over the next one or two decades respectively are considered unlikely. Overall we look forward by 1990 to a total world level of nickel consumption in the 700,000 t0 780,000 metric ton range and prices in 1981 U.S. terms in the $2.50 to $3.00 per pound range.

As to copper, in the past significant and sustained price rises did not accompany sustained increases in consumption, in spite of the gradual shift over recent history from generally higher grade ores to lower grade ores. Part of this is due to the great extent to which copper can be substituted for by aluminum or silica products and plastics.

Upward movements of prices under high growth patterns in the past seem to have been constrained by the capability on the part of producers to quickly increase production, the ready and increasing availability of substitutes and the significant role played by a rapidly increasing potential scrap supply. Concretely, we would expect by the end of the decade a level in copper consumption world wide around, or at least not much in excess of, 10 million metric tons at price levels in the 75¢ to $1.00 per pound range in 1981 U.S. terms. With pro-duction in South America, Australia and even in the U.S. likely to grow faster than consumption, and that in part from very low cost operations, further downward pressures upon real prices may be expected.

The high zinc prices of 1974, '75 and '76 constituted a rather short lived peak and we may expect real zinc prices to revert to their characteristic secular slightly declining trend. Problems of excess capacity may develop in the mid '80s or prior to potential resumption of solid non-inflationary growth. Concretely, we are looking by 1990 at real zinc prices in the 35¢ to 45¢ per pound range in 1981 U.S. terms, and at total world consumption levels in the 6.1 to 6.4 million metric ton range.

While neither aluminum nor bauxite are produced in Ontario, we did consider aluminum markets because it is an important substitute for copper. Aluminum is now moving generally in the same range as the price of copper, but a unit weight of aluminum will in most applications go two to three times as far as the same amount of copper. Earlier anticipations of constraints to aluminum manufacturing capacity due to increasing energy prices are not too likely to be realized. For a variety of reasons the growth of aluminum consumption does not yet seem to have reached the stage at which the trend begins to flatten, and we must be alert for signals that this inevitable turning point is approaching. We may see a 1990 level of aluminum consumption in the plus 20 million metric ton range at prices in the 75¢ to 85¢ per pound range in 1981 U.S. terms. In the past one of the attractions of aluminum as compared to copper has been its greater price stability, attributable largely to the marketing strategies of the three dominant firms, and it cannot be ruled out that this important factor in the aluminum-copper competition may continue to operate.

So much about the outlook for the four commodities for which we have done detailed modelling work. Within the Ministry we have of course engaged in the development of forecast scenarios on a less formalized basis for most of our other mineral commodities. As these did not involve application of our mineral markets simulation model they will not be covered in detail in this paper.

Conclusion

On balance, we are facing in Ontario and in Canada in the '80s, increasingly tough competition for our mineral commodities with no readily discernible chance for sustained price increases. This means that we are facing the distinct possibility of a decline in our mineral activity, unless in a wide range of policy areas measures are adopted which allow significant reductions in production costs on the one hand, and on the other, re-establish in the United States complete trust and confidence in Canada as a reliable supplier of minerals and an attractive target for mineral sector investment.

Over the years, mineral market forecasts developed in the Ontario Ministry of Natural Resources have been disbelieved by many, but on balance we feel that our forecasting record has been better than that of anyone we know of. To illustrate let us look at actual data of nickel consumption since 1977 and compare them with the "most probable projection" given in our 1977 publication, which was based on data series ending with the year 1976. Actual 1977 consumption was 5.5% below the line connecting actual 1976 consumption with the mid-point of the year 2000 "most probable projection", actual consumption in 1978 was exactly on line, actual consumption 1979 was 8.6% above this trend and actual 1980 consumption 4.9% below this trend.

Unpublished, although not unpublicized, internal forecasts for copper and zinc, or energy price trends, gold price trends, iron industry fortunes, cobalt, as well as inflation rates, exchange rates, and other factors have been superior to those of most others, too. In working up this record, our modelling work has been only one tool among many. The key element has been the concept of policy analysis embodied in the structure and composition of the Mineral Resources Branch.

Acknowledgements

The encouragement and support of the Ministry through the years of development are gratefully acknowledged, especially the continuing personal interest of Mr. G.A. Jewett, Executive Director of the Mines Group who originally developed the framework within which mineral policy analysis is conducted at Queen's Park, and Dr. T.P. Mohide, Director of the Mineral Resources Branch, who implemented it. The members of the Metallic Minerals Section made significant ccontributions to the interpretation of scenarios and formulation of forecasts. Professors C.W. Smithson, C.S. Maurice, Hae-Shin Hwang. R.D. Martin and L.F. Worley, under contract to the Ministry, carried out all the econometric work and developed the computer program.

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Detailed references and footnotes would have resulted in too unwieldy a paper. It is felt that a thorough grasp of the factors entering into the development of forecasts would require familiarity with the following:

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5

WAGES AND PRODUCTIVITY IN THE ONTARIO MINING INDUSTRY

by

Alan G. Green and M. Ann Green

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volume is gratefully acknowledged.

This paper deals with the relationship between productivity change and wage costs in the Ontario metal mining industry. The period covered is from the early 1960s to the late 1970s. During these two decades productivity growth underwent a dramatic change. In the sixties the industry's efficiency increased substantially while in the seventies (and into the eighties) a sharp reversal occurred with productivity growth dropping to very low or even to negative values especially during the last two or three years. What then, were the actual dimensions of this change in productivity growth and how did wage costs change with this break in trend performance?

The relationship between wages and productivity at the simplest level is direct. When workers are more productive the market rewards them with higher wages. In turn, all other factors remaining equal, an increase in productivity will shift the demand curve for labour outward and hence increase the wage rate. The other element in this link between wages and productivity is the price of the commodity being produced. If money wages increase faster than productivity and prices, labour's share of total production costs will rise. The effect this will have on returns to capital and hence to investment decisions and innovation are therefore of importance to our understanding of industry performance. The problem is often referred to as the wage-price-productivity nexus.

Growth of Direct and Indirect Labour Costs

The evidence on direct and indirect labour costs was obtained from a sample of 14 Ontario Metal Mining Companies. Direct wages, often referred to as unconditional cash transfers, refer to payment for actual work done. Indirect wages (transfers-in-kind) cover a variety of fringe benefits such as pension and welfare plans, pay for time not worked (holidays and vacations),

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1. This article is derived from work begun several years ago by the MNR in Ontario who commissioned the Centre for Resource Studies at Queen's University, Kingston, Ontario, to develop a volume on statistics for the province's metal mining industry. Much of the evidence, as well as the impetus for this study, came from the most recently published volume entitled Ontario Metal Mining Statistics, Mineral Policy Background Paper No. 16 (Toronto: Ministry of Natural Resources, 1983). The authors were responsible for developing the data series and the accompanying descriptive material for this volume.

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2. For a complete description of the methods and procedures used to obtaining the sample data see "Ontario Metal Mining Statistics", ibid, p. 150ff.

workmen's compensation payments, etc. This survey allowed us to study, for the first time on a micro basis, how the structure of wage payments in this industry has changed over time. With a broader view of labour costs (i.e., including indirect with direct payments) a better understanding of the wage, price, productivity nexus is, we believe, possible at least compared to earlier studies which focussed primarily on unconditional cash transfers.

Table 1 sets out the wage structure; i.e., direct vs indirect wage costs, for the 14 sampled metal mining companies for selected years over the period 1961 to 1979. The figures are two-year averages for the dates shown. This averaging procedure was adopted to modify the influence of short-term variations, e.g., strikes, on the data. The main purpose of this exercise is therefore to reveal long-term trends in wage structure rather than to provide a description of short-run or business cycle influences on the balance between cash transfers and fringe benefits.

The first point to note in the trend of wage payments is their rapid advance over this two-decade period. At the beginning of our period the surveyed companies' total wage outlay was approximately $95 million. By the end of the seventies the outlay had grown to $565 million -- a sixfold increase. This advance in labour costs was approximately equal between the two periods; i.e., wage costs rose about 2.4 times in each decade. As will be shown later in the paper this advance was much more rapid than the growth of the labour force in the industry. The implication of these differential growth rates is that the nominal wage rate (total wages divided by the labour force) increased sharply during this two decade period.

Along with this rapid advance in total wage costs went a dramatic shift in the structure of wage payments. As shown in Column 4 of Table 1, the ratio of indirect to direct wage costs doubled over the study period from approximately 20% of direct payments in 1961 to over 40% by the end of the seventies. Although the purpose of this paper is to explore the relationship between total wage costs and productivity nevertheless a word about some possible explanations for this rise in indirect costs seems in order. For the employees the desire for expanded fringe benefits is that they are usually not taxed. In addition employees may well

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3. The larger study of which this study is only a part seeks to offer and test explanations for this change in wage structure; i.e., the steep rise in indirect to direct wage payments. The larger study focusses primarily on the labour market implicationss behind the observed performance in the metal mining industry.

TABLE 1

Direct and Indirect Labour Costs
Total Metal Mining (1961-1977)

Year	Direct Payments (millions of $) (1)	Indirect Payments (millions of$) (2)	Total Direct and Indirect Payments (millions of$) (3)	Share of Indirect to Direct Payments % (4)
1961/62	79.24	15.33	94.57	19.34
1969/70	192.99	39.79	232.78	20.61
1978/79	392.74	172.22	564.96	43.85

Sources and Methods:

1. This table is derived from Ontario Metal Mining Statistics. See Table p. 154.

2. Figures are 2-years' averages for years shown.

3. Direct wages are wages that accrue to the worker as a result of hours actually worked.

4. Indirect wages cover such items as vacations, holidays, health and welfare benefits, unemployment insurance, pension plans, etc.

believe they as "free goods"; i.e, paid in addition to increases in direct wage payments. For the employer a well articulated fringe benefit programme has the advantage of allowing him to plan more precisely the production process through the application of holiday and vacation agreements; meet government imposed obligations, e.g., workmen's compensation payments; and improve worker efficiency through altering the behavior of his employees; ie., providing subsidized meals, improved health services, etc., all of which might serve to reduce absenteeism and worker turnover.[4]

Model

Since labour cost is just one of a number of expenses faced by the producer, the model chosen to study the interrelationship between wages, prices and productivity is a Cobb-Douglas production function. The latter treats all costs simultaneously combining inputs in a multiplicative format, as follow:[5]

$$q = A \cdot L^{\alpha}.$$

where q = tons of ore hoisted (output)
L = manhours of labour
K = real capital stock
A = a constant
α = factor share.

In this particular form of production function α is assumed to be a constant. Thus $\alpha + 1-\alpha = 1$ and the production function is said to be homogenous of the first degree. Under such conditions a doubling of inputs leads to a doubling of output or in other words there are no economies of large scale production.

This form of production function was chosen for three reasons. First, it is the least complex of later versions of production theory and with the type of data available to us it seemed most reasonable to explore the full implications of the evidence as revealed in the Cobb-Douglas function before moving to more complex functional forms. Second, a study of factor shares for the metal mining industry in Ontario shows them to be roughly constant over

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4. For an extended discussion of those factors which induce employers and employees to seek a greater growth in fringe benefits, see Gunderson, p.204.

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5. The form of the production function used here includes only two inputs -- capital and labour. The decision to exclude other inputs -- for example, material and supply expenses and energy was done to simplify the discussion at this stage of our study. Information on these other inputs has been collected.

our study period, particularly during the decade of the seventies. Third, given the assumption of constancy of factor shares one property of this functional form is that, when placed in index (change) form the average product of labour is equal to the marginal product of labour times α, a constant. This equality is useful to us in the last section of the paper when we compare changes in real wages with productivity in the industry (for mathematical proof of this equality between marginal and average product see Appendix A).

In order to set out the general trends in output and inputs and measure productivity change over the last two decades the production function is transformed to the following:

$$\hat{q} = \hat{A} + \alpha \cdot \hat{L} + 1 - \alpha \cdot \hat{K} \qquad (2)$$

The hats ("$\hat{}$") simply represent percentage change over time and are shown as indexes of the variables where 1971 is the base year; i.e., 1971 = 100.

Table 2 sets out the change of output as measured in tons of ore hoisted and the two inputs: labour measured in number of manhours paid, and real capital stock.[6] The first point to note is the sharp break in output growth between the 1960s and the 1970s. In the former decade output growth was quite rapid; i.e., an increase of 25 index points, while the seventies witnessed virtually no expansion in production. Labour and capital growth did not parallel this change in output. In the 1960s labour input declined by 18 index points while capital expanded by 9 index points. The seventies showed labour input levels remaining almost static while capital inputs decreased slightly. Given the way in which capital stock was estimated[7] it is probably the case that national inputs remained roughly fixed over this second decade, as was the case for labour.

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6. Although only trends between decadal points are shown here, data on an annual basis have been collected.

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7. Real capital stock was obtained by the perpetual inventory method; i.e., an assumption on the life of capital was adopted and this rate of depreciation was applied to the cumulative investment experience of the industry. The resulting estimates were then deflated by a price index of capital goods used in the mining industry.

TABLE 2

Change in Real Output and Real Inputs Plus Capital/Labour Ratio
Total Metal Mines, 1961 - 1977
(1971 = 100)

Year[1]	Output[2] (1)	Labour[3] (2)	Capital[4] (3)	K/L (4)
1961/62	67.3	112.8	82.9	3.35
1969/70	92.1	95.0	91.7	4.42
1976/77	93.3	94.0	86.5	4.19

Sources and Methods:
1. Figures are 2-years averages for the years shown.
2. Output is measured in terms of tons of ore hoisted.
3. Labour is measured in terms of number of manhours paid.
4. Capital is measured in terms of real capital stock.

Figures are derived from Ontario Metal Mining Statistics, ibid..

This differential experience between the growth of output and factor inputs reveals itself clearly in the trend in the capital labour ratio (K/L). During the sixties this ratio rose by 25 percent while in the seventies it stayed relatively stable. This is an important finding since we normally associate technological change with a rise in the capital/labour ratio; i.e., a substitution of capital equipment for labour in the production process. This substitution of capital for labour raises labour productivity as both less labour per unit of output is employed and more output is produced. This substitution process between these two factors apparently stopped in the seventies along with the cessation of output growth. There appears, therefore, to be some association between growth in the industry and its willingness or ability to undertake technological change. This link between output expansion and technical change is one area that needs further study.

To see how productivity has changed during the last two decades, labour and capital inputs, in index form, were divided into the output index. This exercise provides us with two measures of productivity, one for labour and one for capital; i.e., partial factor productivity indexes.

The results of this exercise are shown in Table 3. For the decade of the sixties, when output was expanding rapidly and labour input was actually falling, labour productivity increased by 37 index points and capital productivity by 18 index points. Conversely when output expansion came to a halt, labour productivity failed to increase and capital

TABLE 3

Partial Factor Productivity Change
Total Metal Mines, 1961-1977
1971 = 100

Year[1]	Labour Productivity[2] O/L (1)	Capital Productivity[3] O/K (2)
1961/62	59.6	81.1
1969/70	96.8	100.3
1976/77	99.3	107.9

Sources and Methods:
1. Figures are 2-year averages for the years shown.
2. Labour productivity is the output index divided by labour index. See Table 2, p.4.
3. Capital productivity is the output index divided by the capital index. See Table 2. p.4.

performance increased by only 8 index points. The decade of the seventies, therefore, can be characterized as one of near zero growth in productivity, at least as revealed by these two partial factor productivity indexes. This reinforces the point made earlier that the association in the rise of the capital/labour ratio can be taken as a signal that, in effect, change in the industry had slowed, if not come to a halt.

Our main interest, at this point, is with the relationship between productivity and labour rewards; i.e., the total compensation cost incurred by the various firms. Accordingly, then, we wish to examine, in the course of our study, the relationship between wages and the marginal productivity of labour. Marginal productivity of labour measures the extra output obtained from the application of an additional unit of labour input. In theoretical terms this implies that the marginal product of labour equals the real wage rate.[8] Real wages, in this sense, are defined as money wages divided by the price index of metals for a given year.

8. Marginal productivity of labour is defined as follows:

$$MPL = \frac{\delta q}{\delta L} = \alpha \cdot A \cdot L^{\alpha-1} \cdot K^{1-\alpha} = \alpha B$$

where B = average product of labour. Since real wage equals the marginal productivity of labour then $W/P = MP_L = \alpha B$ where W = money wage rate; P = the selling price of the product.

As mentioned earlier one of the properties of the Cobb-Douglas production function is that, in index terms, average product equal marginal product. Hence one can compare directly the change in average product of labour with the change in the real wage rate. In the long run one would expect, according to theory that these two indexes should move together. However in the short run it is possible for real wages to either outpace or lag behind productivity change.

To study this connection between real wages and productivity, Table 4 was constructed. This table shows, in index form, the change in the average product of labour (assumed equal to the marginal product of labour), and the real wage rate. During the decade of the sixties labour productivity increased by 37 index points while the real wage rate grew by 3 index points. During the seventies labour productivity rose by 2 index points. During the seventies real wages were advancing faster than the physical productivity of labour, especially in the last years of the decade, while they lagged behind increasing efficiency in the sixties. Something, then, changed in relationship between wages and productivity over the two decades. It appears that during the sixties productivity increased faster than did nominal wages, while in the seventies this relationship was reversed. In addition the gap between real wages and measured productivity change, especially after 1970 is probably an underestimate of the true differential since during the seventies, as we saw earlier, the ratio of indirect wage payments to direct wage payments rose dramatically during these years. Many of these later payments are not included in the wage rate shown in Table 4. If indirect wage costs were included wages would have outpaced labour productivity by an even greater margin.

To bring the findings on wage and productivity change into focus it might be helpful to express their interrelationship more precisely. From the Cobb-Douglas production function the following equation can be derived:

$$\dot{W} = \dot{\beta} + \dot{A} + \dot{p}$$

This equation, expressed in terms of rate of change per unit of time, states that the growth of nominal wages (W) is equal to the sum of labour's factor share change (β), growth in total factor productivity (A) and price changes (p). In the sixties and early seventies we found that productivity ($\dot{A}$) increased faster than real wages ($\dot{W}-\dot{p}$) while this inequality was reversed in the seventies, especially after 1975. These inequalities imply that in the early years labour's share (β) should have fallen; i.e. $\dot{\beta} < 0$ while in the seventies we would expect it to rise ($\dot{\beta} > 0$) while in actual data confirm this hypothesis. Between 1961 and 1973

Table 4

Average Product of Labour vs Change in Real Wage Rate
(Index)
Total Metal Mines, 1961-1977
(1971 = 100

Year [1]	Average Product of Labour O/L (1)	Real Wage Rate[2] (Index) Wr (2)
1961/62	59.6	81.68
1969/70	96.8	84.12
1976/77	99.3	95.4

Sources and Methods:
1. Figures are 2-year averages for the years shown.

2. Real wages were obtained by dividing the nominal wage rate by an index of metal prices.

See Appendix B.

labour's share declined from .460 to .330 while from 1972 to the end of our period it increased from the 1973 low to .348. In terms of this type of analysis these are sizable changes and indicate, again, the major change in the relationship between wages and productivity that occurred during the last two decades.

What, then, is the link between real wages and productivity or, measuring wages in current dollars, between nominal wages, efficiency and commodity prices? The one point that seems to stand out in this analysis is the close association between commodity prices and nominal wages. In the sixties the selling price of minerals rose by 44 index points. (see Appendix B) while nominal wages increased by 40 points. In the seventies the two series traced each other even more closely; ie., both rose about 80 index points between 1971 and 1977. Productivity, however, proceeded, as we saw, on its own path rising sharply in the sixties but hardly advancing in the seventies. Furthermore, as we noted earlier, wage increases in the seventies were accompanied by a major structural shift towards a much larger role for indirect wage payments.

These results on industry performance, wages and prices open up a series of important questions regarding the development of this industry over the last two decades. What conditions, for example, induced producers to undertake major capital investments in the sixties but brought this process to a halt in the seventies? Did the inducement to innovate emerge due to changing cost factors: e.g., the difficulty of hiring labour or was it in response to expanding demand for the industry's output? These are critical questions since we must know more precisely than we do now why industries and the economy cease, at certain periods, to advance technologically.

The other major question is the relationship between wage costs and the nature of compensation payments. Why, suddenly should an increasing proportion of wage payments be made in kind rather than as direct wage transfers? Did this shift occur due to employers' desire to lock in workers, i.e., secure a stable labour force, or was the change a result of employee preference; i.e., escaping personal taxes, or finally are we observing simply the consequences of government decisions regarding safety, pensions, etc. Again these are important questions since the observed changes influence employers' decisions on hiring, wages and incentives to change the nature of the production process.

APPENDIX A
Mathematical Proof of the Equality Between Average and Marginal Product in Rate of Change Terms.

The equality of marginal and average product, using a Cobb-Douglas production function is as follows:

$$AP_L = \frac{q}{L} = \frac{A \cdot L^{\alpha} K^{1-\alpha}}{L} = AL^{\alpha-1} \cdot K^{1-\alpha}$$

where AP_L= average product of labour.

$$MP = \frac{\delta q}{\delta L} = \alpha \, A \cdot L^{\alpha-1} K^{1-\alpha}$$

Therefore $AP_L = \alpha MP_L$.

where MP_L= marginal product of labour.

α = constant.

APPENDIX B

Derivation of Real Wage Series

To obtain an index of real wages in the Ontario Metal Mining Industry it was necessary to divide the nominal wage rate (in index form) by an index of metal prices. The nominal wage was derived by dividing the total wage bill for each year[1] by the number of manhours paid for that year.[2]

To calculate an index of metal prices the weighted average price per pound of selected metals was determined annually. These average prices were then indexed with 1971 = 100 as the base year. The metal prices used in this computation were obtained from the General Review of the Mineral Industries, (26-201 1971, p. 26 and 1977, p. 14).

1 Ontario Metal Mining Statistics, p.64.

2 Ibid., p.64.

APPENDIX TABLE B

Index of Nominal Wages, Metal Prices and Real Wages
(1971=100)
Ontario Metal Mining Industry, 1961-1977

Year	Nominal Wages (1)	Metal Prices (2)	Real Wages (3)
			(1) ÷ (2)
1961			
1962	56.64	66.61	85.04
1963	54.07	69.04	78.32
1964			
1965	61.99	79.76	77.73
1966	64.45	89.36	72.94
1967	71.81	91.77	78.25
1968	76.13	93.70	81.24
1969	80.73	98.12	82.27
1970	91.46	106.40	85.96
1971	100.00	100.00	100.00
1972	108.52	106.54	101.86
1973	115.88	140.80	82.30
1974	122.39	192.83	63.47
1975	149.28	181.64	82.19
1976	167.17	177.61	94.10
1977	179.90	185.76	96.84

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THE EFFECT OF CHANGES IN TAX POLICY ON INVESTMENT IN THE MINERAL INDUSTRY: A REPLY TO OUR CRITICS

by

G. Anders, S. C. Maurice, and C. W. Smithson

In 1978, the Ontario Ministry of Natural Resources (OMNR) published "Investment Effects on the Mineral Industry of Tax and Environmental Policy changes: A Simulation Model". The objective of this monograph was to provide users -- both government policy makers and those involved in the mineral industry itself -- with a simple model capable of providing estimates of the impact of governmental policy changes on investment in the mineral industry.

A primary goal of the OMNR study was the development of a model that would require relatively little data. As was pointed out, "... the model here provided if anything reduces rather than increases requirements for costly collection of statistical data which in the subject areas are furthermore often controversial due to their confidentiality. "(OMNR, pg.3) In essence, the authors took a very pragmatic approach to the model development. In order for a predictive model to be of much use in the policy arena predictions must be able to be obtained in a timely manner. If the model has very stringent input data requirements or required substantial computations, it is possible that the time necessary to obtain predictions would exceed the time available for making a decision.

Given this objective of a simple model with very limited data requirements, the authors of the OMNR study elected to use an approach that is most commonly associated with Arnold C. Harberger.[1] In the most general terms, this type of model enables the user to determine the impact of the policy change on the net present value of a representative deposit. Then, the percentage change in investment demand is equated to the percentage change in the net present value of the deposit. While this approach has proved reliable in numerous applications, it is necessarily based on an assumption that is somewhat restrictive. Specifically, this type of model assumes that the interest elasticity (or rate-of-return elasticity) of investment demand is unitary. If this model is to be accurate in its predictions, it is necessary that the investment demand function not deviate substantially from a unitary elastic function. Or, as it was put in the OMNR report itself, the "estimates will be accurate if the elasticity of (the investment demand function) is reasonably close to one." (OMNR, pg. 25).

In a report published by the Centre for Resource Studies (CRS) of Queen's University in 1982, "Effects of Public Policy on Investment Demand: The Case of Taxation in Canadian Base Metal Mining", Brian W. Mackenzie and Charles H. Pye were critical of the approach employed in the OMNR report. Specifically, Mackenzie and Pye had two major criticisms:

> 1) The theoretical analysis and the empirical model do not match in the sense that the former is based on an investment demand function while the latter is based on the net present value of the stream of income generated by the investment.

> 2) The assumption that the interest elasticity of investment demand is unitary is invalid. Mackenzie and Pye assert that their empirical analysis indicates that "... the interest elasticity of Canadian mineral investment demand is much less that unity..." and that "...the depressing impact of taxes on mineral investment can also be expected to be less than that predicted in the MNR study." (CRS, pg.vii)

Since the second criticism is of more consequence, we therefore devote most of this "reply" to the examination of the issue. However, we begin by looking at MacKenzie and Pye's first criticism. Then, before directly examining the question of interest elasticity, we discuss the data requirements of the two approaches. We next turn to the major question posed by Mackenzie and Pye, by looking at their empirics to see if indeed they do have sufficient evidence to conclude that the investment demand function is not characterized by unitary elasticity. This paper concludes with an examination of the results from the two analyses to determine if indeed there is a significant difference in the predicted impact of changes in taxation policies on investment in the mineral industry.

I. INVESTMENT DEMAND AND NET PRESENT VALUE

As Mackenzie and Pye correctly pointed out, the theoretical background for the OMNR analyses considered an investment demand function that was obtained via the ranking of investment projects according to their rates-of-return, while the empirical analyses use a net present value approach. As they noted, "the theoretical basis for this transition (was) not spelled out." (CRS,pg.9).

In order to make this transition, two assumptions are necessary. First, it is necessary to assume that the investment demand function is characterized by unitary elasticity. This assumption was made explicit in the analysis and is of course the area that most concerns Mackenzie and Pye. The second assumption is that all of the investment projects are of the same size. This assumption was implicit in the discussion since the analysis considered only a "representative" deposit.

However, as Mackenzie and Pye correctly demonstrate, the net present value approach will differ from the rate-of-return approach if the potential investment projects differ as to the size of the investment required -- i.e., if there exist large and small projects. Since the mineral industry is characterized by heterogeneous investment projects, it would seem that the assumption of homogeneous investment projects

would be invalid. However, another way of interpreting the assumption used is to view it as an assumption of divisibility in the investment projects.

Put more simply, the OMNR analysis avoids the problem of differing sizes of investments by implicitly normalizing the investment projects. In a specific instance, this would mean that the smallest project would be used as the "numeraire". If a larger project required three times the investment of the numeraire project, it would be assumed that this project could implicitly be divided into three projects. Normalizing -- assuming divisibility of the investment projects -- eliminates the specific problem noted by the authors of the CRS study.

Hence, the "missing transition" is in fact provided by an implicit assumption. In order to go from the investment demand function approach to the net present value approach, the authors of the OMNR analysis had only to assume that the investment projects are divisible.

II. DATA REQUIREMENTS

As was noted in the introduction to this paper, the OMNR study was accomplished with a specific goal of limiting the data requirements. Indeed, if we were to confine our attention solely to the impact of tax policies, it can be seen that the model employed in the OMNR analysis requires data for only five parameters.

In contrast, the CRS study requires much more input data. To indicate more clearly the degree of difference in the data requirements, we have summarized the data requirements for the two approaches in Table 1.

The approach used in the CRS study is similar to the development of an engineering cost function.[4] The authors identified 131 base metal deposits discovered in Canada over the period 1951-1974. For each of these 131 deposits, they then evaluated the physical characteristics of the deposit and thereby obtained the corresponding cost function. (As was noted in Table 1, given the inevitable and often inevitably significant errors in the data for recoverable ore reserves, mill recovery, capital and operating costs, and net smelter returns, it would be very helpful if this cost function provided explicit error estimates.)

Once they had obtained their estimates for the cost functions for each of the 131 deposits, Mackenzie and Pye then estimated the expected net income (or profit) streams that would be generated by each of these deposits. Clearly, this estimation requires as input data the future prices of the base minerals being extracted from the deposits. As noted above, there exists the potential for significant errors in the estimation of the engineering cost functions used. But, it is with these price forecasts that we would expect the largest potential for error to exist.

TABLE 1

Data Requirements

CRS Study	OMNR Study
Deposit Specific Data (131 Deposits)	
- Recoverable Ore Reserves	
- Mill Recovery	
- Mine and Mill Capacity	
- Development Period	
- Capital Costs	
--Development	
--Sustaining	
--Other	
- Operating Costs	
--Mining	
--Milling	
--Overhead	
Industry/Market Data	**Industry/Market Data**
- Metal Price Forecasts	- Total Discount
- Net Smelter Return Conditions	
Tax Data	**Tax Data**
- Percentage Depletion	- Percentage Depletion Allowance
- Corporate Income Tax Rate	- Corporate Income Tax Rate
- Provincial Mining Tax Rate	- Provincial Mining Tax Rate
- Proportion of Income Subject to Tax	- Proportion of Income Subject to Tax

Note: While all the data required for the OMNR approach are publicly available, key data necessary for the CRS approach are not publicly available and may be highly confidential. For example:

.Recoverable ore reserve data are typically highly confidential. Moreover, reserves vary significantly with prices and costs

.Mill recovery rates must be estimated

.Although rated mine and mill capacity, as well as development periods, are usually available, both capital and operating costs are rarely publicly available in detail.

.Net smelter return conditions must be estimated, as custom smelter and refining contracts are among the most highly confidential data.

After the net income streams have been estimated, they can be used to provide the rate of return that would be predicted from each of the deposits. Then the deposits can be arranged in order of descending rates of return to generate an investment demand schedule like that displayed in Figure 4 of the CRS study (page 23).

Since the impact of governmental tax policies is to shift the investment demand function, it is necessary in either the OMNR approach or the CRS approach to specify the parameters of the tax policies. The parameters used by the CRS study are essentially the same as those used by the OMNR study. The fundamental difference is the way these parameters are employed. The OMNR study employs a ratio measure that is intended to reflect the percentage change in the net present value of the deposit after the change in any or all of the tax parameters. The CRS study actually recalculates the rates of return that would be generated by each of the deposits before and after the change in the tax policy and identifies the location of the resulting investment demand schedule.

The point of the preceding discussion is simply to demonstrate the difference both in the data requirements and in the calculation requirements involved in the two approaches. This discussion should not be interpreted to suggest that we find the approach of Mackenzie and Pye to be "incorrect". Indeed, we applaud their enormous undertaking. We find it most useful to actually see the investment demand schedule that resulted from their estimation.

It is, however, the applicability of the CRS model to a policy-oriented analysis of the impact of changes in taxation that we would question. In the context of a policy decision that must generally be made within a limited amount of time, we wonder whether policy makers will ever be in a situation in which they have either all of the necessary data or the time necessary to make the required computations. More specifically:

(1) The CRS model requires almost 1500 data points -- some of these involving sensitive, firm-specific data. In contrast, the OMNR model employs less than 10 data points.

(2) The CRS model involves much more complex calculations than the OMNR model.

(3) Given that all of the parameters used in forecasting the effect of a change in tax policies are themselves estimates, it is very useful to obtain alternate forecasts using alternative values of these parameters. For example, if we have "high/low/best" estimates of a parameter, it would be useful to examine three different predictions of the effects of a change in the system of taxation. Even using the OMNR model with only some 9 parameters, this simulation methodology became relatively complex. In the CRS model -- with some 1500 different parameter values -- a complete simulation (i.e., using alternative values for all of the parameters) is effectively precluded.

III. THE INVESTMENT DEMAND FUNCTION

As noted earlier, the crucial difference between the two approaches is the specification of the investment demand function. As was correctly noted by MacKenzie and Pye, the OMNR analysis was based upon two assumptions:

(1) The investment demand curve has a constant elasticity.
(2) The elasticity of the investment demand curve is unitary.

Instead, Mackenzie and Pye argue that the investment demand function is linear. If the demand function is indeed linear, the remainder of their criticisms follow directly as definitions. To see this point, let us provide a simplified example. In Figure 1, we have illustrated a hypothetical linear demand function (schedule). By construction, this demand function is elastic over the range of output from zero to Q1 and inelastic over the range of output Q1 to Q2. Therefore, the demand function is elastic for prices in excess of P1 and inelastic for prices between zero and P1. If it is the case that the "relevant range" for price is below P1, it follows that the elasticity in this relevant range will be less than unitary. Therefore, any estimate of the impact of a shift of this demand function will be less than that which would be obtained assuming unitary elasticity.

Hence, the discussion is effectively reduced to an examination of Mackenzie and Pye's conclusion that the investment demand function is "essentially linear" (CRS,pg. 51). The remainder of this section will deal with that issue.

In their study, Mackenzie and Pye provide a plot of their estimated base case demand function with a plot of a unitary elastic function overlayed. We reproduce that figure as our Figure 2. According to Mackenzie and Pye: "It is obvious by inspection that the elasticity of the empirical schedule is much less than one/" (CRS, pg.39) We have spent a great deal of time looking at this figure and we fail to see what Mackenzie and Pye found to be so <u>obvious.</u> While we would be willing to agree that the unitary elastic function does not fit the data scatter perfectly, it certainly fits it fairly well. Hence, the question that still must be asked is: Do the data indicate that the demand function differs significantly (in a statistical sense) from a unitary elastic function? To answer this question, the researcher must first determine whether or not the function is linear.

In the CRS study, Mackenzie and Pye assert that they have performed such a test by estimating both a linear specification and a constant elasticity specification (i.e., a log-linear specification) and then comparing the results. From their discussion, it would appear that all that was done was to compare the values of the correlation

Figure 1

A Representative Linear Demand Function

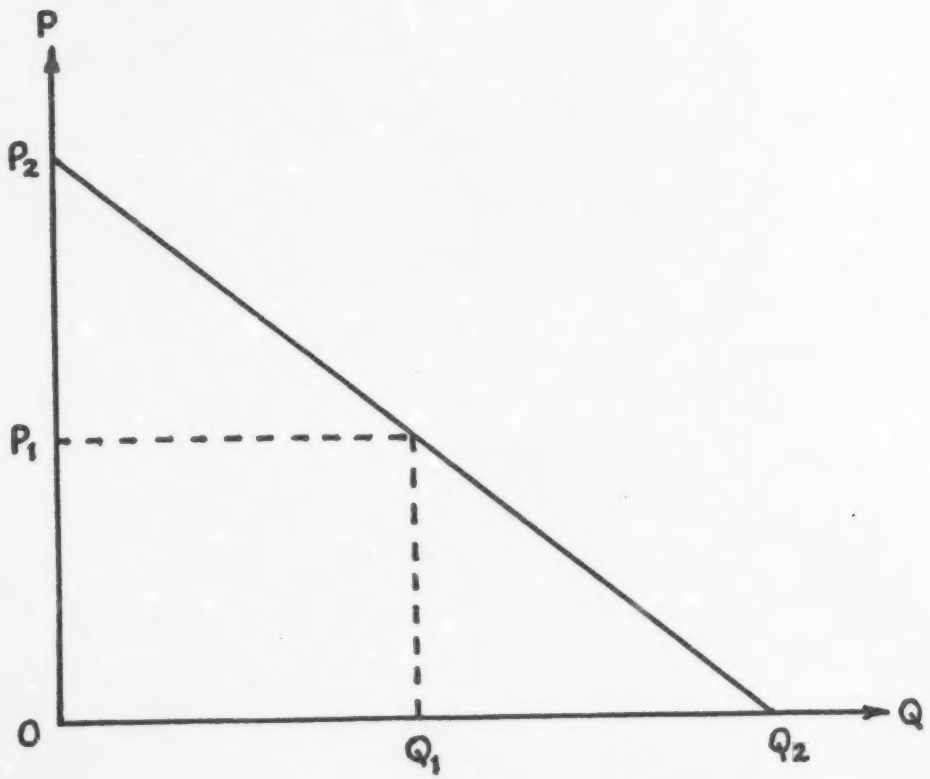


Figure 2

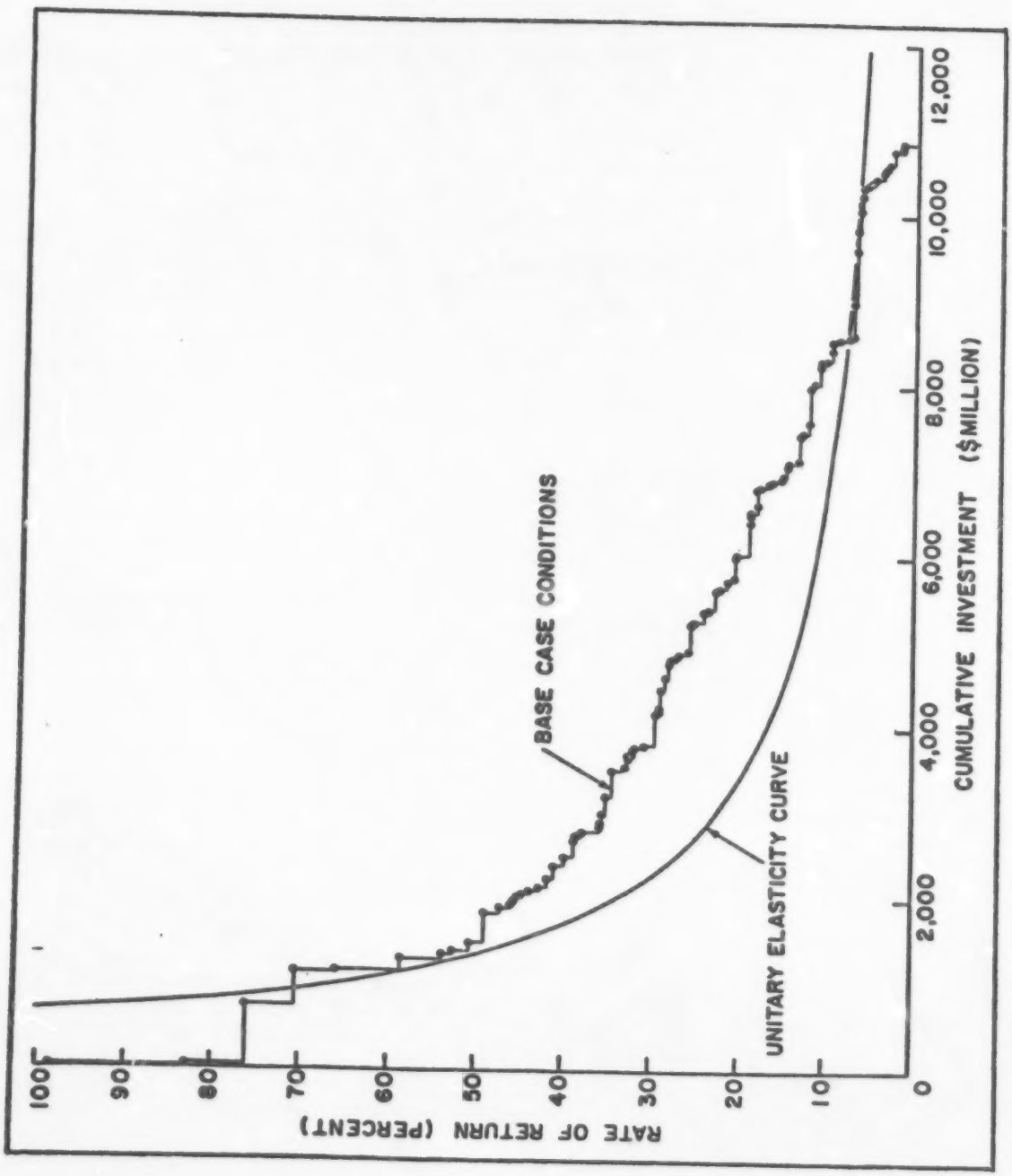


Figure 11. Empirical Investment Demand Curve for Base Case Conditions in Relation to Unitary Elasticity Investment Demand Curve

coefficient (i.e., R-square values) obtained from the two estimations. That is, they assert that since the linear specification "fits" their data better than the long-linear specification, "...the empirical data do not support the assumption of constant elasticity of investment demand." (CRS,pg.41)

While such an approach certainly seems plausible, the problem is that the correlation coefficient is not an acceptable statistic on which to base a test for specification. In more direct language, the R-square values tell us nothing about the underlying form of the investment demand schedule.[3] There are however, econometric tests that can be used to examine this question. Let us briefly illustrate one of these tests.[4]

Mackenzie and Pye wish to be able to demonstrate that a linear specification of the demand function

$$I_i = \alpha + \beta r_i + \varepsilon_i$$

is preferred to a constant elasticity (log-linear) specification.

$$I_i = \alpha r_i^{\beta} e^{\varepsilon_i}$$

In order to perform such a test, we must first propose a specification that contains both of the preceding specifications as special cases. One such specification is the simplest of the Box-Cox transformations.[5]

$$\frac{I_i^{\lambda} - 1}{\lambda} = \alpha + \beta\left(\frac{r_i^{\lambda} - 1}{\lambda}\right) + \varepsilon_1$$

For this specification, if $\lambda = 1$, we obtain the linear specification and if $\lambda = 0$, we obtain the log-linear specification. Hence, if Mackenzie and Pye wish to be able to reject the constant elasticity specification in favor of the linear specification, it is necessary to demonstrate in an (maximum-likelihood) estimation of the Box-Cox transformation that λ is significantly different from 0 but not significantly different from 1.[6]

Put more simply, in order to perform tests of alternative specifications -- linearity vs. log-linearity in this instance -- it is necessary to set up testable hypotheses. The simple examination of the correlation coefficient is not sufficient to differentiate between competing specifications.

We should however note that the estimates presented in Table 8 of the CRS study could have been used to provide an approximation to the test we have outlined above. Given that linear estimates were obtained for a number of subsamples of the full data set, linearity of the demand function would require that the coefficients are equal across all of the estimated equations for the subsamples. More precisely, let us suppose that we assert a linear relation for the entire data set

$$I_i = \alpha + \beta r_i, \quad i = 1, n_1$$

If we then estimate linear relations for several (let us use 3) subsamples

$$I_i = \alpha_1 + \beta_1 r_i, \quad i = 1, n_1$$

$$I_i = \alpha_2 + \beta_2 r_i, \quad i = n_1 + 1, n_2$$

$$I_i = \alpha_3 + \beta_3 r_i, \quad i = n_2 + 1, n$$

linearity would be indicated if

$$\alpha_1 = \alpha_2 = \alpha_3 = \alpha$$

and

$$\beta_1 = \beta_2 = \beta_3 = \beta$$

This type of test -- commonly referred to as a "change in structure" test -- involves the use of an F test.[7] However, in Mackenzie and Pye's discussion, there is no indication that such a test is performed. Instead, they again rely solely on "high correlation coefficients" to assert the "reliability of the linear assumption" (CRS, pg. 43)

Hence, our examination of the CRS study indicates that the authors failed to demonstrate convincingly that a constant elasticity demand function is not appropriate. We did not find the statistical evidence to support their claim that "the investment demand schedules are found to be essentially linear". (CRS, pg.51) Given the absence of such evidence, we would therefore question Mackenzie and Pye's claim that the unitary elasticity assumption is invalid, since in their analysis this claim is itself based on the presumption that the investment demand function is linear.[8]

IV. CONCLUSIONS

The study by The Centre for Resource Studies made some very disquieting assertions -- that the assumption of unitary elasticity assumption is invalid and therefore that the reduction in mineral investment that can be expected to result from an increase in taxation is less than that which would be predicted by the OMNR model. This implies that Mackenzie and Pye are of the opinion that higher taxes would not hurt mineral investment in Canada very much.

To this point, we have countered these assertions with only a technical argument indicating that the authors failed to demonstrate in a statistical sense that the unitary elasticity assumption is invalid. But, the major question still remains: Notwithstanding the dispute about the elasticity of the investment demand function, do the two models differ significantly with respect to their predictions about the impact of changes in taxation on investment in the mineral industry?

Mackenzie and Pye used their model to estimate the impact of the change in the taxation system from that used in 1969 to that of 1976. (See Table 5, page 30 of the CRS report). The authors of the OMNR study estimated the effect of the change from the 1969 system of taxation to that of 1974. (See page 69 of the OMNR monograph). In Table 2, we have summarized these estimates.

Since the studies evaluated two different ending years, the two estimations are not directly comparable. Moreover, it should be noted that the changes in the tax system from 1974 to 1976 basically had the effect of reducing the tax paid by the mineral firms. More specifically, in the case of Ontario, subsequent to 1974, a number of major revisions led to significant reductions in the tax burden. Some specific revisions were:

1975 - Provisions for disaggregation of designated mines
Extension of the processing allowance to the construction stage
Increase in the processing allowance to 35%

1976 - Offshore processing costs were allowed
An exemption from the 65% processing allowance limitation was introduced.

The impact of these revisions are presented graphically in Figure 3.

Hence, were these differences in the ending years taken into account, it is clear that the two predictions would get closer together. Indeed, it is quite likely that the two estimates are not significantly different (in a statistical sense).

The answer to the basic question appears then to be that the two approaches do not differ all that much in their predictions. In a sense, this tends to lend some additional credence to the assumption of a unitary elastic investment demand function.[10]

The OMNR model is clearly the simpler of the two approaches, both in the sense of data requirements and in the sense of the computations required. However, since the "bottom line" is that the approaches do not differ substantially in their predictions, the choice of the more appropriate model would have to be made by the user on the basis of the specific application.

TABLE 2

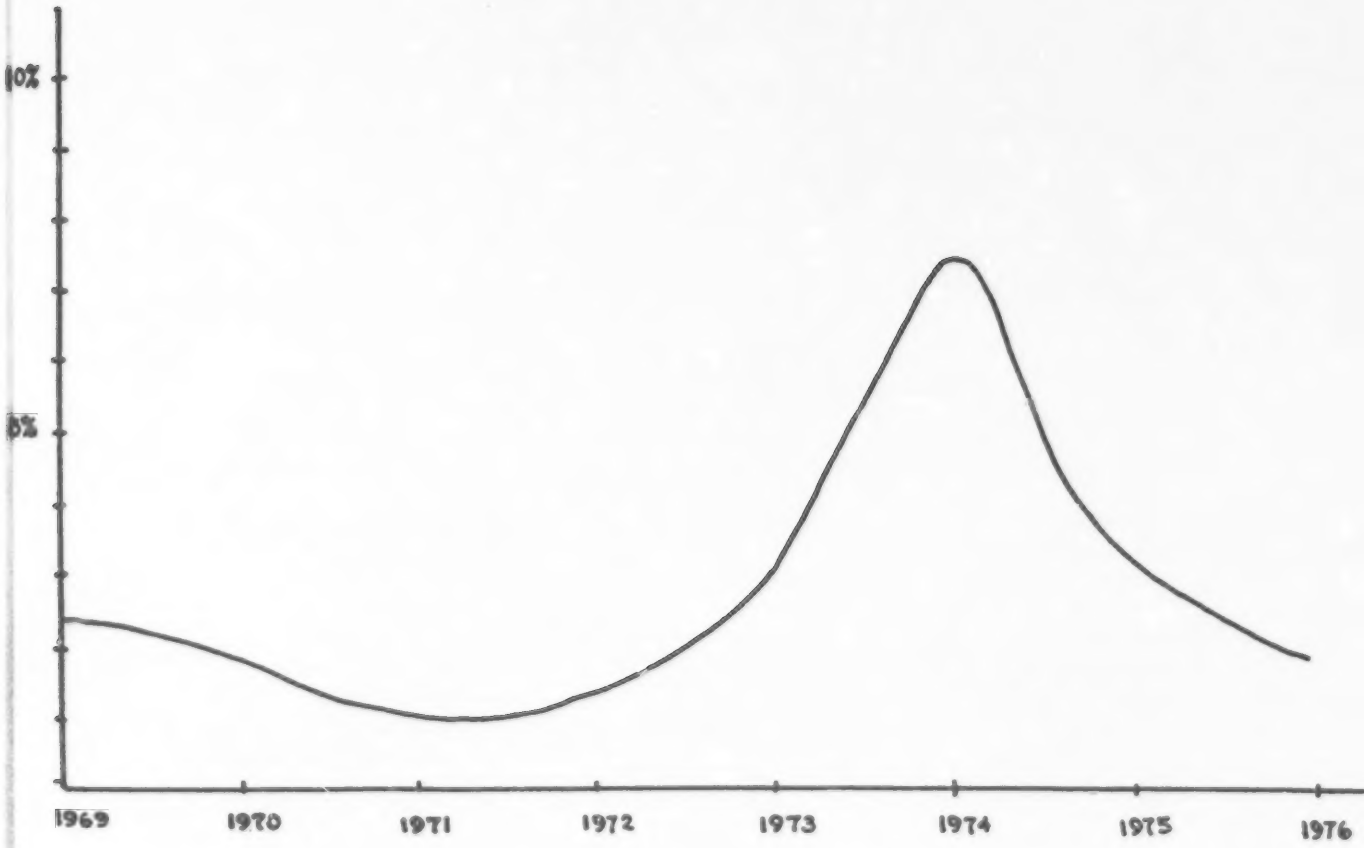
Predictions

Taxation System	OMNR Study	CRS Study
1969	-12% to -30% (Ontario)*	
1974	-14% to -35% (Canada)	-16% (Canada)†
1976		

*See pages 69 and 72 of the OMNR monograph.
†See Table 5 (page 30) of the CRS monograph. This estimate assumes an 8% discount rate.

Figure 3

Ontario Mining Tax
(Percent of Value of Production)



FOOTNOTES

1. For some illustrations, see Taxation and Welfare (Boston: Little, Brown and Co., 1974).

2. An elementary description of engineering cost functions is provided in S. Charles Maurice and Charles W. Smithson, Managerial Economics (Homewood, III.: Richard D. Irwin, 1981), pp. 280-284.

3. For a general discussion of the limitations of the R-square and other ad hoc methods of looking at the specification issue, the reader might wish to see George G. Judge, R. Carter Hill, William E. Griffiths, Helmut Lutkepohl, and Tsoung-Chao Lee, Introduction to the Theory and Practice of Econometrics (New York: John Wiley & Sons, 1982), pp. 600-601.

4. A more complete description of this test can be found in Jan Kmenta, Elements of Econometrics (New York: Macmillan, 1971), pp. 466-468.

5. For more information regarding this transformation, see G. E. P. Box and D. R. Cox, "An Analysis of Transformations," Journal of the Royal Statistical Society, Vol. 26, 1964, pp. 211-243.

6. A more ambitious test would involve non-nested hypothneses. For more information on this topic, see Judge et al, op cit.

7. See Kmenta, op cit., pp. 373-374.

8. Moreover, it should be noted that it is essential only that the investment demand function be characterized by unitary elasticity in the "relevant range". Returning to Mackenzie and Pye's Figure 11 (our Figure 2), it is certainly not "obvious" that a unitary elastic function is inappropriate in the 5% to 15% rate of return range.

9. More specifically, the endpoint for the OMNR prediction was the 1974 amendments to the 1972 Ontario Mining Act.

10. In addition, it is useful to note again that the after-tax elasticities calculated by Mackenzie and Pye were

    0-25% rate of return - 0.144 to -1.013
    0-15% rate of return - 0.144 to -0.336

While they asserted that these estimates were much less than unity, no tests for statistical significance were performed. Looking again at the illustrative estimates provided in Appendix A of the OMNR monograph, the estimated elasticity for investment demand in mining was only -0.589 -- a value that is again much less than unity. However, when the

not be shown to be significantly different from minus one. The lack of any substantial difference in the predictions certainly opens the question of whether Mackenzie and Pye's estimates can be shown to be significantly less than unity.

7

MINERAL TITLE, LAND USE ALLOCATION AND MINERAL INVESTMENT

by

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Introduction

There is broad agreement that the investment climate in Canada in general and in the mining industry in particular has over recent years not been good and that it is declining. Debate about investment climate issues has been long, often noisy and most certainly unproductive. Many causes have been cited: Commodity prices, taxation, inflation, subsidized competition from the Communist block and from the Third World, labour policy, environmental policy and others. As none alone provides an adequate explanation, there is some danger to throw up one's hands, to say that the issue is too complex and that nothing can be done - and that despite the fact that per factor unit employed, mining creates more wealth for Ontario than any other significant industry.

Recently a number of topics surfaced which enable us to focus this debate upon a core common to those of the above issues related to Canadian government action - in a way that enables us to unravel all the manifold domestic policy causes of declining mineral investment climate. There was the so-called patriation of the Canadian Constitution, the Federal Mineral Policy Discussion Paper and the revision of the Ontario Mining Act, and most lately, apparently increasing preoccupation within the Department of Energy, Mines and Resources, Ottawa, with the problems involved in having Canadian mineral sector related policies suit the New International Economic Order (NIEO). The element common to the policy factors adversely affecting the mineral investment climate in Canada is the increasingly broad-based erosion of, if not attack on, private property rights or, in our context, increasing attenuations or encumbrances of mineral title through many different mechanisms, "mineral title" in a wide sense also encompassing title to the necessary factors of production complementary to mining lands.

The fundamental fact is that the new Canadian Constitution does not mention private property rights. The new constitution is thus entirely compatible with policies which increase levels of intervention in the industry, with attempts to eliminate firm title to mineral property, such as are implicit in any commitment to NIEO policy principles, as well as with the many ways in which rights to factor returns are diminished further and further through taxation, inflation, labour and environmental policies, and planning and other administrative constraints.

Analysis of what ails the industry, it is suggested, as far as policy factors are concerned, best begins from a unified approach to the analysis of the economic implications of property rights attenuation. It is this the present paper is intended to do.

Section 2 begins with a discussion of the development of mining title in Ontario in as far as it reflects general trends and covers some related issues on the general principles of title acquisition. Section 3 illustrates the current status of property rights in land and presents data on comparative factor productivities, again on the example of Ontario, in ways which are pertinent to the issue of mineral title acquisition and retention. Section 4 provides a review of the development of the analysis of property rights attenuation. Section 5 presents a simplified but unified approach to the problem of property rights attentuation or encumbrance of mining title and points out the economic consequences and how they are compounded in various areas of economic decision-making. Section 6 provides some conclusions which flow from this analysis.

The Development of Mining Title in Ontario

Let us consider some of the changes with respect to title which had been proposed to the Ontario Mining Act, as being symptomatic of broader trends in property right structures governing factors of production important to mining. These trends largely determine the current investment climate. Let us note however that these proposals have been repudiated by the Hon. A. Pope, Minister, in the speech to the Financial Post Conference on Gold, which opens this volume.

The acid test for new legislation is whether such changes enhance or inhibit the creation of new mineral wealth production and of new mineral sector jobs.

The central issue now in discussing revisions of the Mining Act and of other legislation affecting mineral investment, is the perception of such proposed revisions by the investor, whether foreign or domestic. This determines the future health of the industry.

Any such perception, while it is necessarily subjective, incorporates objective information on the legislative environment and its history and of current economic conditions. Changes in policy factors in Canada are perceived against the background of increasing international competition for metal sales and for investment capital, and of other jurisdictions' trends in legislation affecting mining.

The heart and soul of the incentive to sink tens or hundreds of millions of dollars into a new mine development is the acquisition of satisfactory land title - including access to the minerals - and the retention of satisfactory title to the other factors of production by their individual private sector owners.

The commercial risks of failure in any new enterprise are high in any case and the investor is going to be more unlikely to incur them if they become compounded by uncertainty of title to assets or to the returns expected to flow from them.

Concern over todays image of Ontario and Canada as perceived by the potential investor in mineral wealth has been well put as follows: "For thirty years Canada was the place to invest, the land of opportunity. In two or three years that view has been destroyed. Now it is around the world that Canada is not a safe place to invest". (Lipsey)*

Our investment image has been damaged because of FIRA, NEP, Saskatchewan and Quebec nationalizations and tax changes, B.C.'s bizarre tax experiments. It had been endangered further now by some changes which had been proposed to Ontario's Mining Act and by apparent increasing preoccupation on the part of the Federal Government with making Canadian mineral policy fit in with the New International Economic Order (NIEO), and on the part of Ontario with land use planning.

The Ontario Mining Law of 1906 reflected prevailing attitudes toward private property, particularly in the means of production. It was largely this property rights climate that accounted for the steady element in the growth trend of mining throughout the first three quarters of this century. This positive posture may have been due to the fact that while earlier, in Canada and elsewhere, mining laws generally originated <u>within</u> government, the Mining Law of 1906 was largely the result of the Mining Convention of December 1905 which generated crucial recommendations <u>outside</u> of government, recalling the origin of much American mining law in the spontaneous miners meetings of the California gold rush. (Hoover)

While elsewhere it was the general rule that possession of the soil did not also confer possession of the minerals, the general rule in Ontario became that the owner in fee simple of the land owned the minerals also and vice-versa.

While elsewhere strong nationalistic urges restricted the acquisition of title by and operation of foreigners, in Ontario citizens and individual aliens became free to prospect and mine, and foreign companies only had to obtain a "licence in mortmain" - a mere formality. While elsewhere preliminary prospecting licences covering large areas had the effect of biasing

* Names in brackets refer to the major author whose ideas are quoted, condensed or paraphrased. Specific works are cited in the bibliography.

law in favour of the large corporation, in Ontario the holder of a miner's licence was authorized to stake anwyhere on public lands and upon satisfying basic requirements became entitled to a patent in fee simple. While elsewhere disputes over titles went through the regular courts, frequently leaving titles uncertain for lengthy periods, Ontario miners were freed from the jurisdiction of ordinary law courts, assuring quicker and more certain adjudication of disputes over titles.

The Mining Law of 1906 initiated a long period of real growth in the value produced by Ontario's metal mining industry. This period lasted over half a century. The trend was sometimes accelerated as by the 1934 increase of the gold price by over 60%, sometimes reversed as in the two post war corrections. But the recovery from the reversal that started in 1961 was of much shorter duration than that from the previous two. Instead of the long smooth resumption of real output growth for periods of 15 to 20 years, experienced after the bottoms of the previous recessions, there has by now been a decade and a half of violently fluctuating output values, extraordinarily high gold prices for a few recent years obscuring somewhat the magnitude of decline in the real output trend. (Fig. I).

The last strengthening of title occurred in 1922 with the dropping of the requirement of proof of discovery, substituting willingness to expend time and money for development as adequate proof of "subjective discovery". In 1931 came the first legislative provision for cancellation of claims used for purposes other than mineral development. This reintroduced differentiation between surface and subsurface rights and reversed a key element of the 1906 Mining Law.

Out of this tiny beginning grew todays' situation of highly attenuated title, not only in land but, through parallel developments in other policy fields, in other factors of production. Today title is not only encumbered, following the Carter Commission, by a far more difficult tax regime, but by the Foreign Investment Review Act, Environmental Legislation, Labour Legislation, by large scale land withdrawals and constraints of land use to satisfy various special interest groups. Each individual measure that nibbled away at the principle of secure and certain title easily acquired has been abundantly justified. While the possibility of obtaining clear title has in law not yet been changed, any title to mineral property has become far less secure and uncertain in the last two decades, when all encumbrances, legal or administrative, on land title and on the ownership of other factors of production are looked at together. Significantly, a right to property is not part of

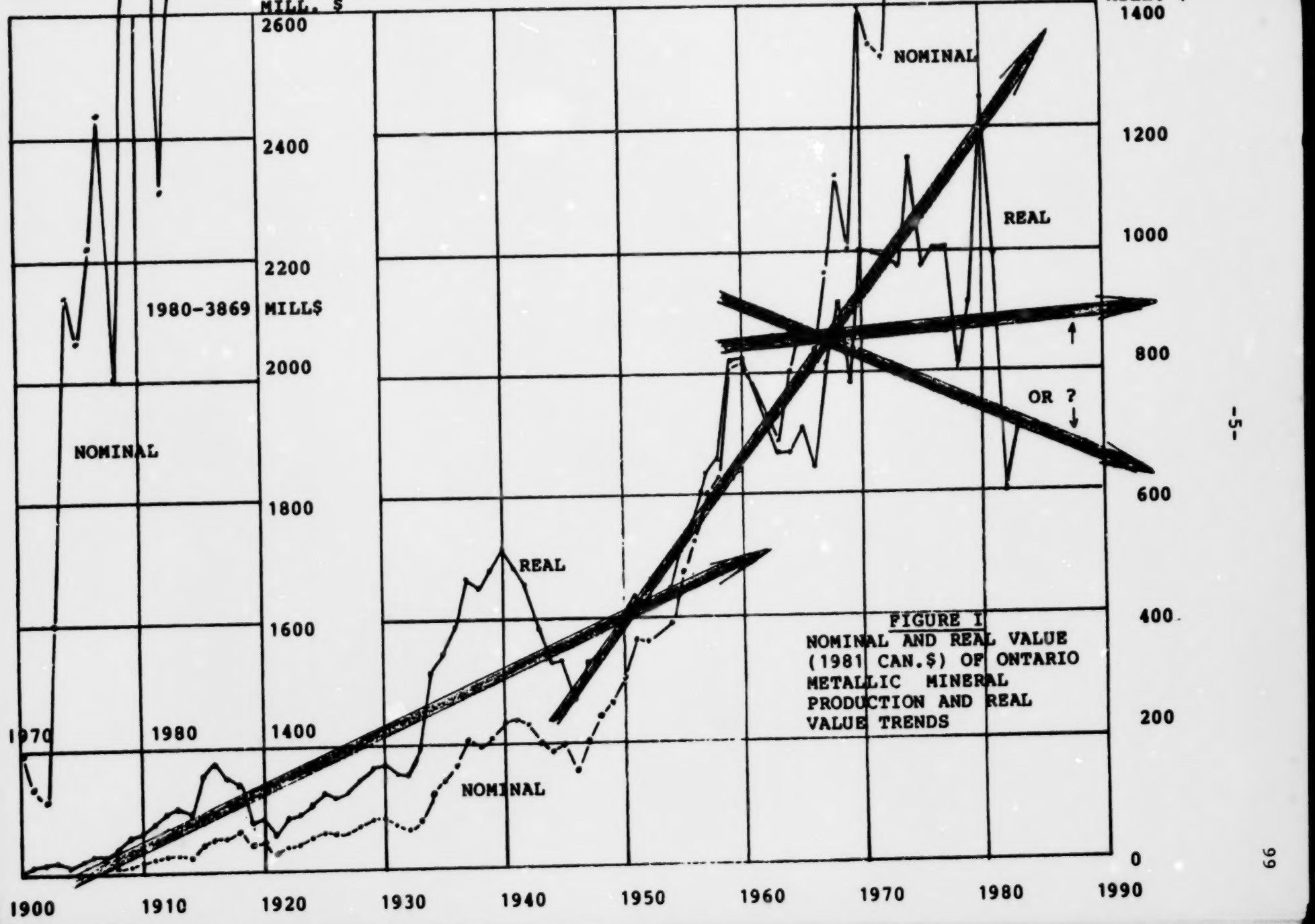


FIGURE I
NOMINAL AND REAL VALUE (1981 CAN.$) OF ONTARIO METALLIC MINERAL PRODUCTION AND REAL VALUE TRENDS

Canada's new constitution - nor is it compatible with the "Global Paternalism" (Kirkpatrick, McCulloch, Bruner, Bauer) of the NIEO to which our Federal Government now apparently subscribes.

The decline of Ontario metal mining or of Canadian metal mining, coupled with the much increased frequency and amplitude of fluctuations of production values of the last two decades, cannot be explained by market factors alone. The hypothesis that the changing institutional framework played a role is strong enough to suggest that failure to reverse the trend of the last two decades of property rights attenuation could well result in the virtual destruction of Ontario's and Canada's metal mining sector by the end of this decade.

The banks have always hesitated to provide funds for a new minerals venture, where title was too restrictive or defective. In 1933 Thomas A. Gibson stated that it is obvious that a grant by which the Crown divests itself of all claims is a more stable form of title than a lease subject to forfeiture. (Gibson). Claims held under leasehold patent remain subject to government control, and approval procedures for transfers can be easily instituted to serve a wide variety of policies, such as land use planning or control of foreign ownership, encumbering mining rights further. Ownership of other assets - fixed capital, even entrepreneurship and other human capital, one's ownership of one's own body - has by various attenuations now moved into a category more akin to leasehold than to fee simple. Encumbering a title to any asset, whatever its original quality in law, by reservations and unpredictable and lengthy administrative procedures, reporting and filing requirements to be gone through separately and repeatedly for each different planned use or change of use, significantly detracts from its value and that is true whether such encumbrances serve purposes of environmental, of labour, of welfare or of any other "social" policy goals.

In Ontario, management of land title transfer from the public into the private domain, encouraging mineral development in areas of negligible value productivity in any probable alternative use, is being subjected to administrative planning and coordination objectives and may culminate in a fundamental change at law. The abolition of new patents in fee simple and the strict separation, under leasehold patent, of surface and mining rights have been expressly put forth, but were for now rejected, as policy options - as have mandatory disclosure of exploration and associated proprietary data over and above what is now required to obtain title. This rejection hopefully, will be symptomatic of a changing - back to trends with respect to property rights in other human or non-human assets.

The initially proposed changes would have been retrograde steps in the direction of feudalism.

At this point let us digress for a moment and clarify some points on resource ownership. We are used to saying that mineral resources belong to the Crown in right of the Province, or to the people or to the community, but prior to prospecting, none own anything more than an unidentified mineral potential and they cannot own anything more as far as the "mineral endowment" of the Province is concerned.

Under the Natural Law principles which are the foundation of our legal system, as far as Crown land in the north is concerned, Government has sovereignty but no property. It administers unowned land until private property in it can be established. If "mixing of current or embodied labour" is used then as the criterion of original property, land can be acquired by a miner, a farmer, a "tree farmer", an industrial or resort developer, but not by a woodcutter, a naturalist, a camper or a hunter. These latter are the counterparts of primitive hunting, gathering and slash and burn tribes who do not acquire permanent property in a fixed parcel of land by increasing its value productivity through investment but diminish its value productivity instead through exploitation. (Quigley) Without the establishment of private property in land there is no incentive to further improvement.

The Crown only carries out certain functions of sovereignty and of administration until such time as "unowned" Crown land can be transferred into private property. Under Common or Natural Law principles surface rights and mining rights then always go together. On Crown Land, a grant of mining rights carries with it the right to all necessary surface usage according to the maxim "Quando aliquid conceditur, conceditur etiam et id sine quo res ipsa non esse potuit" (when any right is granted, there is also granted all that without which the right cannot be exercised) - and that without any of the limitations that may have to be considered where surface rights had previously been held by some individuals, with mineral rights having been kept reserved to others. Any other interpretation is tantamount to an assertion that our whole legal system has already changed, for instance, to conform to NIEO principles.

Sovereignty over an unidentified potential is not worth much unless the Crown discharges its stewardship by facilitating transfer into secure certain and complete private property title. The fact that under patent in fee simple, a property which had been developed originally for mineral production is later used for something else, is irrelevant. It is the

nature of private property that it can be used for any variety of purposes, and bought and sold. If anything, clear title provides an inducement to the owner to preserve, or increase, the value productivity of the property under alternative uses. The concerns in this respect of the land use planner are unnecessary and unjustified. The strongest supporter of firm title then would be the investor, defined as one who is willing to risk his own human or physical capital, embodied earning potential already accumulated as a result of previous activity and saving, in a mineral venture by combining it with the assets of the Crown, its sovereignty over an unidentified potential.

The demand for attenuation of property rights in factors of production originates with non-owners who want to use the political process to obtain powers of control over aspects of assets usage, who want to reroute income streams flowing to asset owners proper. These are essentially bureaucrats, members of special interests groups, naturalists, unions, idealists in pursuit of a dream.

Any group that wants to promote alternative land uses or to strongly modify mineral exploitation practice through legislative override of market determined land use allocation according to factor productivity, promotes essentially wealth re-distribution at the expense of wealth creation.

Property Rights and Comparative Factor Returns in Ontario

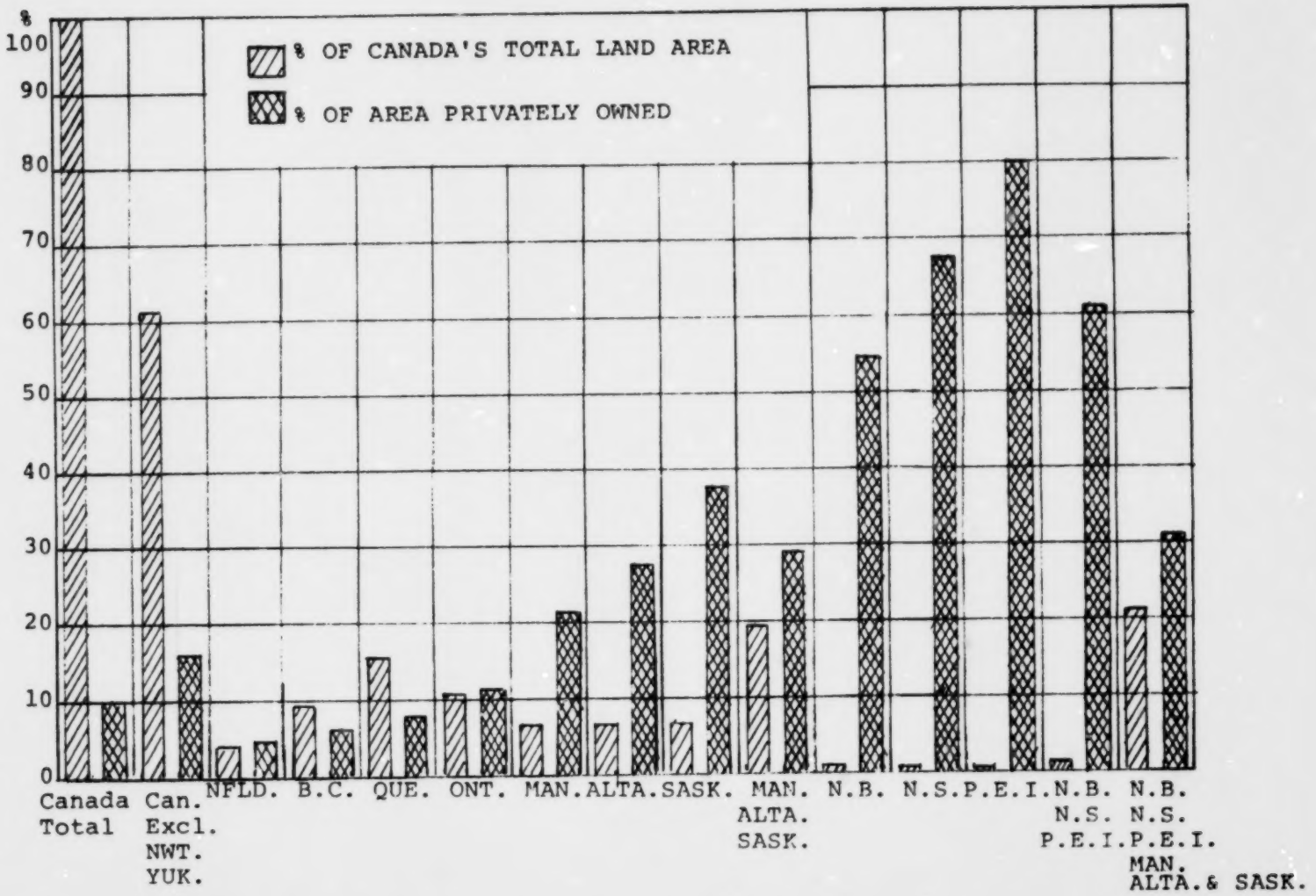
We like to think of Ontario as one of the most private enterprise oriented Provinces in Canada. From the statistics on land tenure in Canada, provided by the Canada Year Book, an ambiguous picture emerges as far as the past is concerned. (Fig. II).

Of all of Canada's land area, 9.64% is privately owned. This figure is influenced to a considerable extent by the large land mass of the Northwest Territories and the Yukon Territory which are virtually uninhabited. Correcting for these areas, private land ownership in Canada excluding the Northwest Territories and the Yukon Territory amounts to 15.9%. In Ontario, which accounts for 10.7% of the Canadian land mass, only 11.14% of all land is privately owned.

For Manitoba, Saskatchewan and Alberta combined (19.7% of Canada's land) 28.96% are privately owned, the figures for these 3 Provinces range from 21% to 38%. In Prince Edward Island, Nova Scotia and New Brunswick (1.34% of Canada's land) 60.95% of all land is privately owned, the range being from 54% to 80%. In these 6 Provinces combined, accounting for 21% of

FIGURE II

PRIVATE LAND OWNERSHIP IN CANADA - BY PROVINCE



Canada's land, an area twice as large as Ontario, 31.01% is privately owned. These 6 Provinces account for 67.6% of all privately owned land in Canada.

In an area twice as large as Ontario, 5 1/2 times as much land is privately owned. Considering that large parts of Northern Manitoba, Saskatchewan and Alberta are as inhospitable as large parts of Northern Ontario, the process of transferring unowned land from the public into the private domain, the essence of the Crown's stewardship of public lands, has in Ontario moved rather slowly, suggesting that in this crucial area the actions of the Ontario government have historically been less free enterprise oriented than those of some other Provinces. Some of the originally proposed revisions to the Mining Act with respect to title, would have indicated a desire to further slow down this process. As it is, there are now in Ontario 54 ways of securing to government rights to private land other than by simply buying it. (Foster)

A most disturbing development has been the emergence, at the recent Premiers' conference, of increasing support for claims to native (Indian, Eskimo,Metis) "sovereignty" of some sort or another over large tracts of land, as reported in The Globe and Mail of March 16th, 1983: of elevating to "contentious issue" status such native claims to resource ownership. But the concept of Canadian Indian "nations" is a contradiction in terms - moreover such artificial entities could not prosper but would relapse into a pre-contact primitivism unless culturally they ceased to be natives. For the cause of support for such notions one must not look to facts or analysis but perhaps to Anthony Trollope, whose Prime Minister once said that politicians look for grievances not because they are heavy but because the honour of abolishing them will be great, and pointed out that when great measures are coming fast, often more is broken in the rattle than is repaired in the reform. In the context of an already deteriorating private property rights climate any perception on the part of the investor of overeagerness on the part of government to adopt short-run policy responses to private interest group demands will engender expectations, that is fear, of further inroads into the rights of private property.

However there are now definite indications that this trend may reverse. In a speech to the Financial Times Conference on Gold (Toronto, Westin Hotel, March 11, 1983) the Hon. Alan Pope, Ontario Minister of Natural Resources, asserted that the old principles of acquisition of mineral title and of the inviolability of title and of proprietary data will not be changed and further, that the land base open for exploration will not be diminished. Although this is a promising

sign, the question as to the general trend of property rights development still remains very much open. The point is that policy moves toward attenuation of title already could go as far as they did - and the proponents of attenuation, inside or outside of government, are rarely discouraged in their efforts by one reversal.

The trend towards increasing attenuation of title in mining lands and towards the general erosion of property rights in factors of production becomes more difficult to understand if one compares some factor productivities between mining and other industries.

The bulk of Ontario's mineral wealth originates in the northern part of the Province where alternative potential uses of land are limited. The total area of Ontario "directly affected by mining", that is land surface which during the life of mining activity is not available for concurrent other uses, is between 65,000 and 75,000 acres, out of a total Ontario land surface of about 220 million acres. This is 5.6% of the area covered by roads. Only 1.35% of all staked, patented and leased land is "directly affected". The area "directly affected by mining" produces on average in excess of $50,000 of new wealth for every acre, every year. The value-productivity of all patented and leased land would still be over $2,000 per acre per year.

By comparison agriculture in Ontario - mostly in Southern Ontario - produces on average just over $300 per acre per year of new wealth, figures for sub-sectors ranging from $150 per acre per year for wheat to $1230 per acre per year for fruit. It would take agriculture 167 years to generate the same wealth on one acre that mining generates on one acre in <u>one</u> year.

The value of production of Ontario's forestry industry most closely corresponding to the above is the value of total shipments of roundwood by the logging industry. Applying this figure to the smallest acreage figure applicable to Ontario's forestry industry, land under timber licence - over 700 times the figure for "land directly affected by mining" - the new wealth produced by Ontario's forest industry per acre per year - is just over $7.00. This figure - $7.00 per acre per year - is the figure comparable to that of $50,000.00 per acre per year for mining. The forestry figures comparable to the $2,000.00 per year for mining would be between $2.18 (total forest land) or $3.04 (productive forest land) and $3.24 per acre per year (Forest land in management units).

As to the material value produced by parks only the roughest estimate is possible. If one takes Ontario

data on total expenditure in the Province by travellers, divides by number of person-trips and multiplies by number of provincial park visitations, then divides this "value of production" by Provincial Park acreages, one arrives - doubtlessly a gross overestimate - at a figure of just over $25. - per acre per year of new wealth (?) created by land used for parks. The area covered by Provincial parks in Ontario is over 150 times as large as the area directly affected by mining.

The picture is similar with respect to the value productivity of labour. Value added per employee per year in Ontario's textile and wood industries is 40% of that in metal mining, in food and beverage and primary metal industries it is 60% to 66%, in smelting and refining it is 60% and in transportation equipment and clinical products it is 76% to 80%.

Any estimate of the wealth creation by hunting or trapping which is forgone on land used for mining results in quite ridiculous figures. To illustrate, if all land affected by mining were returned to these alternative uses, it would result in a total of 9.1 moose and 6.3 bears more killed per year in all of Ontario (Anders, et.al.)

Clearly, if production of new material wealth is the criterion among competing uses of Crown Land, the decision must fall unambiguously and by a wide margin in favour of mining.

However, claims are often advanced in the name of so-called amenity values inherent in unspoiled nature, frequently alleged to be incalculable, incommensurable with and superior to any material values that might be produced. It is a fact that the vast majority of people live quite happily in environments totally removed from "nature", thus quite unaware of its existence. It is a further fact that man's greatest cultural and civilizing achievements have been made in totally "artificial" environments. Many of the greatest civilisational achievements consist literally in the substitution of an unnatural for a natural environment.

The questions asked with respect to amenity values (and appeal to them often only thinly disguises the material interest of small groups) is who defines them and who benefits in terms of either power or nonmonetary rewards. Nobody questions the desirability of some amenity values, but how much and where? If specific amenity values to be protected are demonstrably - by actual frequent visit and use prior to parks development - enjoyed by a significant number of people who are not either administrators, researchers, or

members of the top 10 percent income brackets, such protection warrants some measure of priority. If these conditions are not satisfied, the prospective producer of new material wealth has a good case to expect that the highest priority be given to his claim.

If the proponent of the superior claim for amenity values still rejects comparison along these lines on the ground of the absolute incommensurability of his amenity values with any quantitative criteria whatsoever, he must be countered by reference to the supreme amenity values inherent in the private property system.

By all accounts one would expect that encouraging acquisition of title in land for mining would be accelerated by a free enterprise oriented government. That this has not happened but rather the opposite, suggests that the political trend toward private property rights attenuation is stronger than economic facts. The facts cited in the preceding paragraphs do not imply a judgement of the political merits of the policies involved but the price to be paid for that in terms of future living levels of the people of Ontario and of Canada is likely to be high in material terms.

The Development of the Analysis of Property Rights Attenuation

After describing the changing institutional environment governing title to mineral lands and to other factors of mineral production and describing some of the pertinent facts of life regarding land tenure, land use allocation and mining in Ontario, it is time to review briefly the development of the economic analysis of property rights.

The recognition that rights and legal relationships at least partake of some of the characteristics of economic goods goes back over 2000 years. They belonged in Roman times to the class of immaterial goods - res incorporales. Still highly relevant in a mineral policy or Third World development context is a discussion in John Locke's Second Treatise, of how property originates in previously unowned land i.e. by mixing it with labour, whether current or embodied. However, systematic enquiry into the economics of property rights may be said to have started with E.v. Bohm-Bawerk in his paper on "Legal Rights and Relationships as Economic Goods" of 1881. The discussion of externalities, the basis of many of todays interventionist policies, particularly in the environmental area, started in 1920 in Britain with A.C. Pigou's, The Economics of Welfare, which was critiqued in detail by S. Cheung.

Of the pertinent fundamental work done more recently includes that by F.A. Hayek, R.H. Coase, J.M. Buchanan,G. Tullock and on a more specific level, by S. Cheung, S. Pejovich and O. Johnson. An excellent summary was provided in 1972 by E. Furubotn and S. Pejovich.

From another perspective - a critique of Keynes - W.H. Hutt analyzed how resources become under - or unemployed through property rights attenuation inherent in inflation and how the asset stocks of a society assume a less productive structure.

Key propositions deriving from this work may be summarized as follows:

Legal rights and relationships are not economic goods separate from and in addition to the physical things to which they ultimately pertain. They are attributes which give to physical things or to the services rendered by them economic goods character. These attributes deal with the form of the connection between persons and goods. Legal rights and relationships are economically significant only as far as they embody or imply physical control over goods or the means of acquiring it. (v.Bohm-Bawerk)

The economic content or implications of rights and relationships are based on the role that the state or its agencies play through the administration of justice in the acquisition and maintenance of physical control over goods. With respect to title to land, or to other factors of production, it is the function of legislation to afford to individuals the means of utilizing the states' laws to obtain physical control over land and resources in order to transform mere potential for wealth creation into actual wealth. (v.Bohm-Bawerk)

The distinction between physical goods themselves and the services they are capable of rendering is at the root of important distinctions as to the gradation of rights. Renditions of service do possess a character of independent economic entities. The concept of rendition of service allows division of the full and present power of control over tangible goods into separate rights to partial utilization, such as servitudes and rentals in the present, or to the allocation of rights to future proceeds to be derived from goods, such as credit or long term leases. This allows for the fuller utilization of goods by provisions for the orderly relinquishment of full and present ownership of control in small segments to a variety of individuals who do not want the full and continuous service a good is capable of rendering. In the present context it is most important to realize

that the power to tax is nothing but a legal right to partial confiscation of a good, simply less drastic than total expropriation. (v. Bohm-Bawerk).

As the extent of title modifies the economic character and value of a good, or the services it can render, changes in the structure of legal rights and relations affect the value of all assets which are touched by such a structural change. The concept of a non-material good is essentially no more than a figure of speech. (v. Bohm-Bawerk) Much intervention into land tenure patterns today is based on the assertion, that it assures to non-owners of land the possesion of non-material goods. i.e. amenity values. Many measures of land use control are developed in pursuit of such non-material goods. The point is that these alleged immaterial goods are not independent goods in addition to the material goods, i.e. land, over which control is sought. The preservation or protection of non-material goods or amenity values always involves the control over and modification of material values.

The argument for state intervention to internalize negative externalities by positive action is faulty because it neglects to consider the two-sided nature of both externality phenomena and their regulatory cures. Furthermore, the constraints assumed to underlie the analysis of social costs or externalities following Pigou, have been shown to be mostly invalid, and the observations reported by way of empiricial verification have frequently been incorrect. Property rights convey the right to benefit or harm oneself or others and where such benefit or harm falls cannot be accurately foreseen and is rarely restricted, as a result of changes in property rights structures designed to eliminate alleged externalities,to those it is intended to affect and in the ways it is intended to affect them in a positive or negative way. (Cheung).

In the large areas of the Western World, now most important to mining, North America, Australia, South Africa, the primitive aboriginal tribes, who largely followed a hunting economy had not established or developed any concept of property rights in land prior to white culture contact. Assertions of property in large land areas on historical grounds reaching into precontact times are invalid. (Demsetz, v. Mises).

There is no dichotomy between property rights and human rights, the latter are a subset of the former. Any infringement of private property rights therefore by definition infringes upon basic human rights. (Rothbard).

Everybody's property is nobody's property and no individual has any incentive to preserve, to maintain

or to refrain from abusing or despoiling what is common property. Invasion of private property in the name of land use planning, that is the superiority of "communal or everybody's" property rights is therefore necessarily going to be counterproductive. Land use planning is at its root an extension of the communal concept of ownership and control which has produced the abuses of our natural resources in the first place. Land use planning represents a step backwards and not a step forward. (Gramm).

At the root of the erroneous assertions about the nature of the predictability of the effects of land use and other economic planning, that is of the modification of property rights structures, in pursuits of specific and quantified economic policy goals, lies a number of major confusions as to the economic effects between rules and commands, about the role of knowledge in society and about the phenomenon of unintended consequences of a policy action. (v. Hayek).

A SIMPLIFIED ANALYTICAL APPROACH AND ITS IMPLICATIONS

While in our society the basic role of government traditionally has been to safeguard individual property rights, over the last decades the bulk of government action and legislation in Canada, particularly in areas pertinent to mining, has tended to imperil such rights. The effects of private property rights attenuations in different policy fields are usually rationalised on redistributive grounds but they are always negative in terms of wealth creation and they all interact. To cut through the complexities created for non-economists by the different analytical approaches taken in different areas of property rights attenuation, one simplified analytical device is developed in the following to show how the process of attenuation must retard the pace of wealth creation, the rate of investment and the chanelling of investment, particularly into mineral development, and how this process, if carried far enough and for long enough, must lead to increasing immiserization of our society.

The process of capital formation, disposition and management behind the development of a new mine or other productive facility can for the present purpose be broken down into four logically successive trade-off decisions by individuals. Society's institutional environment and the changes in it wrought by legislation can bias each decision. As these decisions are logically successive, biases created at the successive stages are compounded, particularly if they are either positive or negative at all stages.

Under a strong private property rights regime, the compound bias will be towards long term benefits and wealth creation. Under a highly attenuated private or strong communal property rights regime, the cumulative bias will be towards short term benefits and wealth consumption.

The four key economic decisions are, in sequence:

1) the leisure/labour decision; a decision between production for income or the immediate enjoyment of rest and relaxation. This decision is influenced today primarily by the attenuation of one's property in one's self through minimum wage laws, closed shop or other union membership requirements, occupational licensing requirements, such health and safety legislation as is more re-distributive than reasonably protective, and through attenuation of property in the results of one's labour, primarily through the "progressive" personal income tax.

2) The next decision is the consumption/investment decision; it biases the disposition of one's income, either towards the present through immediate satisfaction of one's wants or towards the future through the postponement of satisfaction. This decision is today primarily influenced through attenuation of property in capital goods, via corporate taxes, profit taxes, capital gains taxes. Both the labour/leisure and consumption/investment decisions are influenced as well through property rights attenuation, i.e. diminution of real income both from labour and from investment, through inflation.

3) The third decision is the portfolio selection decision which may be biased towards investment in projects of either short gestation period and in highly mobile assets, or towards projects of long gestation period, predominantly in largely immobile assets. It is affected today by attenuation of property in land and in assets attached to land (zoning, land use planning, transfer restrictions), by reduction of security of title in such properties, and pertinent to mineral development, e.g. today in Ontario, by measures reducing the unowned Crown Land base open for exploration, extending the "Commons", whether by parks planning or by surrendering elements of sovereignty to natives. This attenuation imposes an at times very strong asset utilization constraint, which as far as mineral development is concerned would tend towards the preferred development of projects with a short lead time and short pay back period. Short lead time militates against major mineral developments; short pay back period in a mineral development introduces a bias towards highgrading. Inflationary expectations and expectations regarding future political developments play a very important role in this area.

4) The last decision is the managerial efficiency decision, which has conventionally been analyzed in terms of the managerial conversion curve (Pejovich). The decision by the manager, in the widest sense, whether to emphasize more the income maximization of the owners of the capital resources entrusted to him or to attempt to convert as much of the potential capital owners' income stream to his own benefit, is influenced primarily by corporate taxation, affecting capital owners, and by income taxation affecting managers. The property rights attenuation inherent in both forms of taxation today biases the efficiency decision largely in the direction of "managerial inefficiency" in this technical sense.

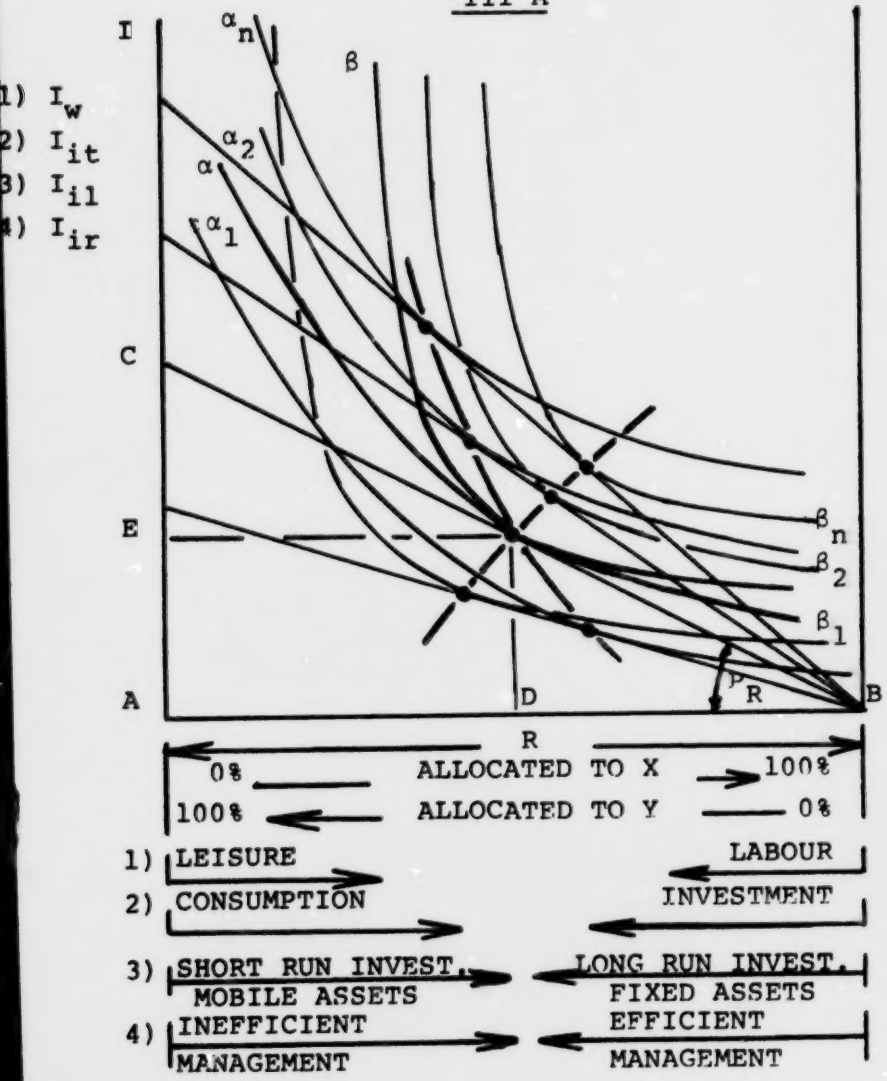
All the trade-off decisions discussed here can be analyzed by a generalization of the graphic approach to the derivation of labour supply curves from indifference curves (Ferguson and Maurice), as expanded to encompass the effects of income taxation on the shape of the leisure/labour indifference curve and consequently on the shape of the labour supply curve.(Anders).

In figure III A a resource R (horizontal scale), available per time period can be allocated to two uses: the production of goods X and Y, Y typically being a good serving longer term goals, while X satisfies more short term or immediate desires. The vertical scale gives the "income" I per time period from the portion of resource R to the production of Y, allocation to X being its own reward. All indifference curves α characterize the resource owners' subjective preferences under conditions of no or minimal attenuation of his private property rights in the resource R or its yield. The externally given price line BC determines, at the tangency point with indifference curve α, the way the individual will actually make his allocation decision. Of the total resource R available per time period, AD will be allocated to X and DB will be allocated to Y. AE becomes the income per time period from allocation of R to Y. AC would be the income per time period if all R is allocated to Y; if all R is allocated to X, that income becomes zero.

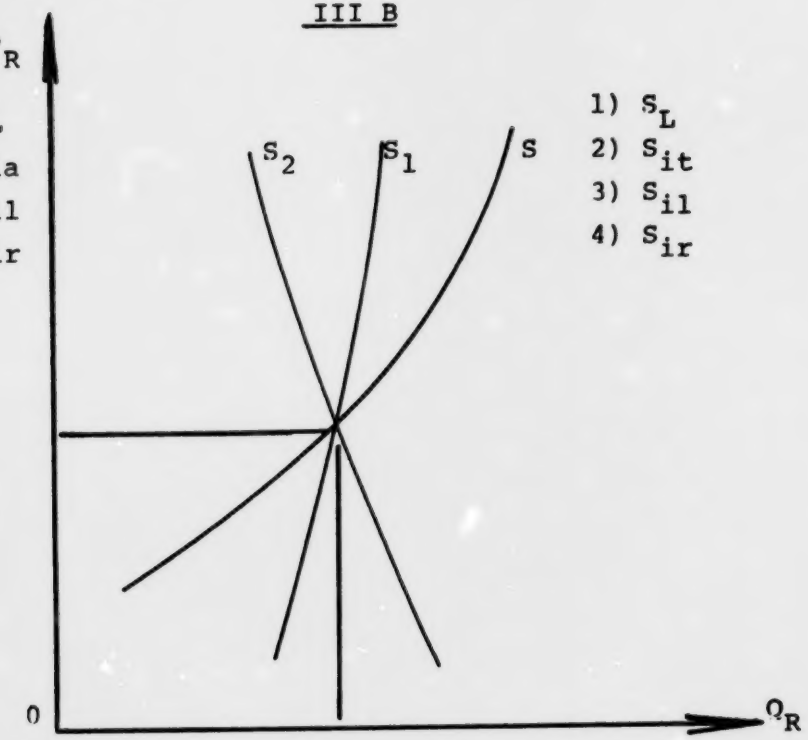
Figure III B plots the quantity of R allocated to production of Y (DB in III A) in which Q responds to changes in P , the unit price for X, i.e. in the ratio of CA to AB in Figure III A or in the slope of BC (P_R). By changing the slope of the price line BC, different tangency points with the everywhere dense indifference curves α_1, α_2 and α_n indicate changing allocations of R to X and Y resulting from price changes. If all these tangency points are plotted in figure IV B, the positively sloped supply curve S emerges.

Fig. III : THE GRAPHICAL ANALYSIS OF THE KEY ECONOMIC DECISIONS AS AFFECTED BY PROPERTY RIGHTS ATTENUATION

III A



III B



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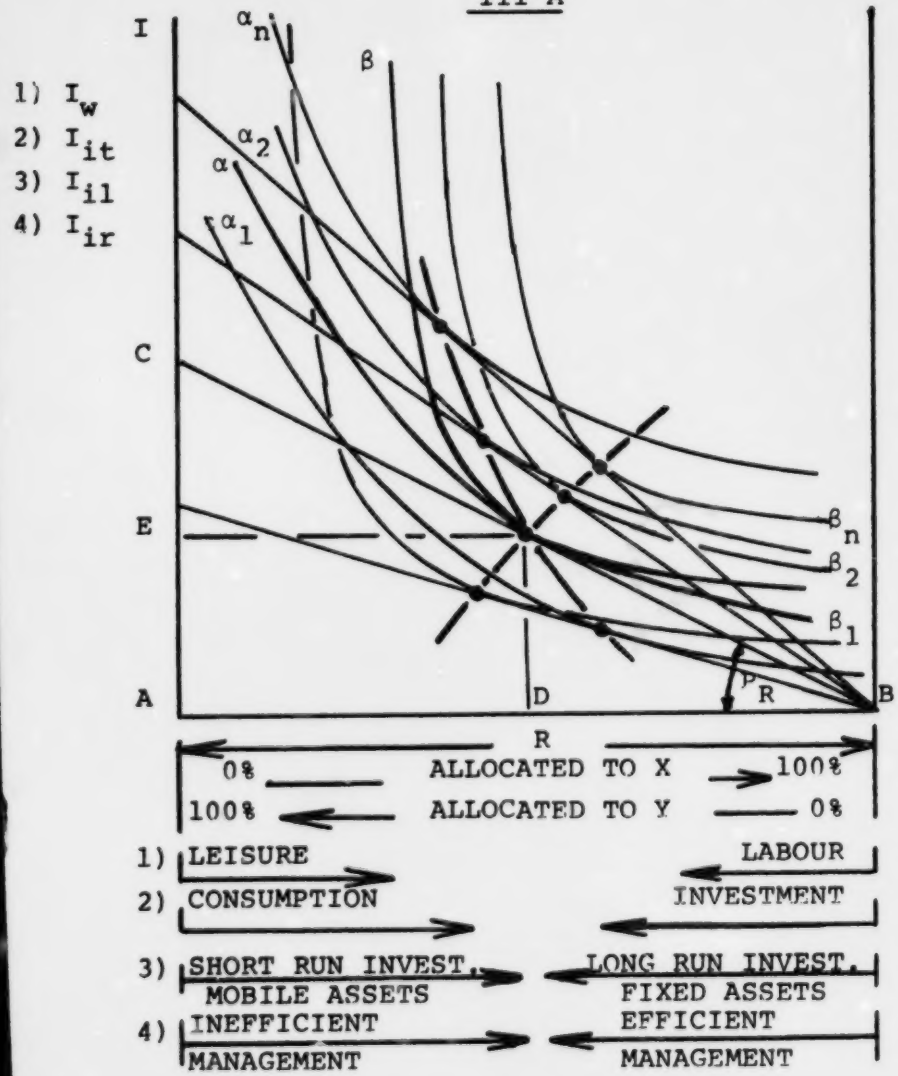
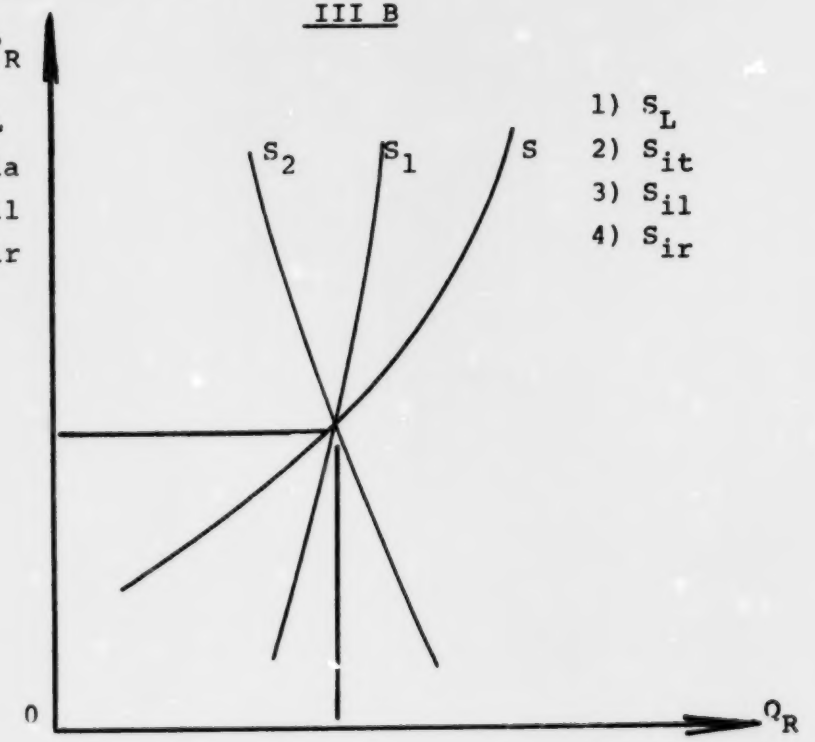


III B



As modified to take account of the effects of property rights attenuation upon the shape of indifference curves, the typical indifference curve becomes steeper in its upper and flatter in its lower reaches. These effects become more pronounced the more progressive the attenuation in income derived from the allocation of resource R to Y becomes. They are even further accentuated when this progressivity at high rates of income of the most hard working or efficient individuals allocating much R to Y is compounded by subsidization of low incomes of less hard working or of inefficient individuals allocating much R to X or of zero income by individuals allocating all of their resource R to X. Trade-offs are affected so that indifference curves, now under high levels of attenuation of private property in resource R or its yield, come to have the shape of indifference curves β in Figure III A. From the tangency points of price lines with indifference curves of type β, a supply curve S_1 can be derived which will at a minimum be much steeper than the supply curve derived earlier and in the extreme case can become negatively sloped throughout as in supply curve S_2.

To move from this general case to the four specific allocation decisions discussed earlier, we only have to give the elements in Figures III A and III B the appropriate names.

1. In the case of the leisure/labour decision, an individual's time (total hours per day, f.i.) becomes the resource R, good Y becomes labour, good X leisure and the ratio CA to AB becomes the wage rate. On the vertical scale, income I becomes the labourer's money income Iw from wages. In Figure III B, the horizontal scale becomes the quantity of labour Q_1, and the vertical scale the wage W_1, the supply curve becomes the supply curve of labour S_1. With increasing attenuation of property in income from labour, such asa progressive personal income tax compounded by increasingly "attractive" wealth transfer programs - other things being equal, workers' labour/leisure indifference curves change from α to β shape, the money income from allocation of time to labour decreases as more time is spent on leisure, and the response of labour supply to changes in the wage rate becomes weaker if not perverse, S shifting towards S_1 and eventually S_2. The total amount of money income available per time period for the next step in the decision sequence becomes smaller.

2. In the case of the investment/consumption decision, the resource R in the first instance becomes now an individual's total labour income per time period; AE from case (1) becomes R for case (2). Good Y becomes investment, the source of future income

streams through the creation of capital goods. Good X becomes immediate consumption. The slope of BC becomes the average rate of interest (or return on capital) for all kinds of investment or savings. DB is the part of labour income that has turned into capital. I_{it} is total income from all forms of investment, AE the actual yield per time period from DB. AE is "recirculated" and becomes an addition to Labour income and subject to a second investment/ consumption decision. In Figure III B the horizontal scale now indicates the total level of investment Q_{it} the vertical scale the average interest rate R_{ia}. With increasing attenuation of property in yield from saving or investment - returns from capital -, for instance corporate profits tax, Ontario mining tax,personal taxation of income from rents, interest or dividends - allocation of income to saving and to investment decreases, allocation of income to consumption increases, the supply curve of capital for all kinds of investment S_{it} becomes more inelastic or even perverse.

3. With respect to the portfolio selection decision, in Figure III A resource R becomes the total amount of investment capital available -DB from case (2)-, good Y becomes investment in projects of long gestation period in predominantly fixed capital assets, good X becomes investment in projects of short gestation period of an essentially mobile character, and income I becomes the income per time period from projects of long gestation period I_{il}, yield AE from DB is recirculated to (2). On Figure III B the horizontal axis now indicates the quantity of investment in such projects Q_{il} and the vertical distance the rate of return applicable to long term investments R_{il}. The effect of attenuation of property, specifically in long-term investments in fixed assets is a change in investors' long term/short term indifference curves from α to β shape and results in a shift from long term investment in fixed to short term investment in mobile assets. Such attenuations of property rights in land and assets attached to it, such as capital-goods-producing factories, mines and smelters, through land use or land transfer constraints, consist not only in increasing insecurity of title in land and mineral rights, increasing difficulties of acquisition of original title in "unowned Crown Land" - but even in the expectation of such attenuations engendered by policy stress on land use planning or zoning. Specific effects in the mineral industries are increasing emphasis on the development of only the relatively highest grade deposits, and within individual operations, on the extraction of highest grade portions of the deposit - anything ensuring short pay back periods.

4. For the purpose of analyzing the managerial efficiency decision, we have to keep in mind in interpreting Figures III A and III B, that whereas so far decisions involved owners' allocation of their own resources to alternative uses controlled by them, now we deal with the allocation on the part of one resource owner, the manager, of his own resources - time, effort, skill, honesty - to the handling of the resources - long term investments, - owned by someone else. The managerial efficiency decision modifies the results of (3).

Resource R becomes in Fig. III A the capital entrusted to managers of long term investment projects - DB from case (3). Indifference curves now illustrate the manager's - and not, as in (3) the owner's - response to changes in expected rates of return, prompted by investors' vigilance which is a function of that same rate. Y becomes efficient management applied to DB - the time and effort of the manager allocated to the optimization of investors' income, AE, the yield from DB, going to the investors. X becomes "inefficient "management" applied to AD - managerial time and effort allocated to the conversion of potential investors' income to the managers' personal use - usually in the form of specific rather than general consumption, making the conversion itself more "inefficient". The slope of the price line BC becomes the rate of return on capital invested in long term projects (same as in 3).

The income axis I becomes I_{ir} - the yield from the efficiently administered portion of long term investment available for re-circulation, either via owners' dividends or via internal financing, as investment capital.

In Fig. III B, Q_{ir} on the horizontal axis becomes that same amount of reinvestment funds from long term projects, AE from III A, now plotted against the rate of return - the price of such capital R_{ir}. While case (3) showed how attenuation of private property rights in land diminished the proportion of original or primary investment funds allocated to long-term investment, case (4) concentrates on the diminution of secondary or re-investment funds available for long term projects. Viewed differently, case (4) shows how the consideration of the managerial efficiency effect reduces the total amount of long term investment derived in case (3). Whereas under minimal or zero taxation of corporate profits higher expected yields from long term projects will result in a significant positive supply $\frac{AC}{AB}$ response to III A increasing, under high rates of corporate profit taxation specifically in long-range projects, managers'

indifference curves will change from α to β shape and the efficiency of management of affected assets and with it the supply of re-investment capital will decline.

The effects of the wide variety of legislated attenuations of private property rights discussed earlier compound then in summary form as follows: (1) Highly progressive personal income taxes, combined with high levels of transfer payments to persons and minimum wage legislation, reduce the amount of labour offered and increase voluntary unemployment. (2) The now lesser amount of total income from labour potentially available for disposition is allocated to a greater extent to consumption than to investment as a primary result of increasing corporate taxes particulary on profits. (3) Of this decreasing amount available for total investment, more is allocated to short term projects and mobile assets and less to long term projects and fixed assets as a result of property rights attenuation in land and assets attached to it through taxes on real property, land use and transfer constraints (land-use planning) and increasing difficulty of original acquisition of unowned (Crown or Federal) land. (4) This decreasing proportion allocated to long term projects and fixed assets is less efficiently administered by managers, decreasing the amount of long term investment yield available for re-investment. Less efficient management is more readily tolerated by owners as a secondary result of corporate profit taxation and the double taxation of distributed after tax profits at highly progressive income tax rates.

Gradually the rate of capital accumulation decreases, eventually becoming negative. The existing capital stock ceases to be maintained and declines, production possibility frontiers start moving backward. Thus "progressive" economic policy results in increasing poverty - society moves back towards more primitive stages. This trend is somewhat retarded by the emergence and growth of an "underground economy" (non-mineral!) accompanied by or based on increasing inefficiency and corruption of the organs of government. Decreasing observance, breaking of "rules" which interventionist government imposes in opposition to the basic "laws" pertaining to the safeguarding of private property that government in the traditional Anglo-Saxon order was meant to uphold, becomes more moral than observing such rules, and turns into a positive economic force.

The problem, as regards the, mining industries is that property rights attenuation of all kinds affect the three sectors particularly strongly due to the biases in individual decisionmaking - introduced by corporate

profits taxation and by mineral or land title diminution - against long-term investment in fixed, i.e. land-related assets, as discussed under (3) and (4) above.

Conclusions

It has been shown in the preceding that the problems of mineral title and land use allocation, in their relationship to the unsatisfactory state of Ontario's mineral investment climate, are a crucial part of a much larger issue. In concluding, let us just indicate the real magnitude of this larger issue in some detail.

A great political and legal scholar, G. Dietze, said that:

> "infringements upon property are detrimental to the survival of democracy. They quell individual effort, the very prerequisite for progress. This deprives man of his dignity..... the individual is not only induced to be lazy but he is also considered to be unable to take care of himself. The healthy are treated as if they were sick, the mature as if they were children. The physically fit are made psychologically ill and the naturally independent are made artificially dependent. Individuals become spoiled and lose confidence.... In a complementary process (the welfare state) abets the less desirable elements of society....Neurotically, people worry a lifetime over paying their debts. An increasing number acquire luxuries without bothering about the obligations they contract, trusting that their irresponsible attitude will be matched by their government through further legislation in favour of debtors complemented by inflation."

The property attenuating policies which ultimately serve the purpose of transferring wealth or technology to underdeveloped nations (NIEO) will have further counterproductive results.

Such third world nations

> "will begin with blackmail. They will threaten to align themselves with the communist bloc. The sums demanded will become bigger and bigger. In the end, when we finally refuse to pay because we are being bled white, they will join the hostile camp. We, their benefactors, will become their victims. Aided nations will not merely forget to show their appreciation. They will openly display their want of appreciation and not shy away from attacking us".

But most important, is the general decline in the appreciation of property. It

> "implies more than just a want of appreciation of material goods, bad as this is. It means the lack of appreciation ofall that we have been able to accumulate through hard work during the course of our civilization. It implies disregard of our cultural achievements. It amounts to a rejection of our heritage. It involves negation of ourselves as spiritual beings".

F. A. Hayek, who adds to the qualifications of the preceding author those of a Nobel Laureate Economist, points out that ultimately the justification of private property is a moral question. Thus the constructivist (engineering) emphasis on a narrowly "rational" justificaion of a policy measure in defense of property does not apply. He stresses that the great merit of traditional morals was that they would have evolved by long run effects which people did not foresee or understand. "And the merits of the institution of private property and of saving are that in the long run those groups that adhered to them have prospered". In justifying the rights of private property in particular contexts, detailed "rationalist" attempts at quantitative analysis are of limited usefulness for illustrative purposes. Hayek pointed out: "There is good sense behind the cost-benefit argument, but I don't think it's of great practical value".

It has been indicated that the chances of our mineral industry to get out of the current declining trend are relatively slim. Only unremitting pressure, fighting every encroachment on property, based on principles not expediency, may provide a chance for success. An example is the response of the British Columbia Chamber of Commerce to the Federal Mineral Policy Discussion Paper in which they categorically reject cash grants of any kind as measures by which government usurps the prerogatives of shareholders, officers and directors of a company. This has to be supplemented by a broad based educational effort. Only such a general and persistent approach will make for mining the difference as to whether the contribution of the mineral sector will develop along the path of the upper of the lower future trend in Figure I.

The final question is whether there are, beyond these general suggestions, specific solutions that can be recommended. Yes, there are such solutions, but to discuss them in the present context would carry us too far. Furthermore, even to discuss such solutions would be totally pointless until the implications of the preceding argument, in terms of what is likely to happen, sink in not only among the members of the

mineral industry, but among the population at large and within government. This appreciation of the real problem has effectively not been achieved yet and is not likely to be achieved for many years.

POSTSCRIPT

Since this paper was first written Ontario has rejected proposals for abolition of new patents in fee simple and the strict separation of surface and mining rights. In June 1983, the Honourable Alan Pope, Ontario Minister of Natural Resources, announced the publication of a set of land use guidelines to serve as a basis for improved resource allocation decisions on crown lands. He noted that there was no intention of interfering with the rights and responsibilities of land owners and municipalities. On September 2, 1984, the Canadian people elected a new federal government whose announced policies are supportive of free enterprise.

Nevertheless, the future of free enterprise in Canada and Ontario, particularly in the area of our concern in this paper - mineral resources - will best be served when the implications of the arguments presented herein are understood and accepted by members of the industry, the population at large and within government.

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Executive Coordinator.

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SECTION III

MINERAL TRADE ISSUES

8

CANADA - UNITED STATES NATURAL RESOURCE INVESTMENT CONFLICT AND STRATEGIC MINERALS

By

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The United States gradually became more vulnerable to mineral supply disruptions during the 1970s largely because the Carter Administration pursued separate policy objectives without a unifying strategic outlook. First, the doctrine of Third World primacy in American foreign policy disregarded the implications of expanding Soviet Union projection of military power into less-developed zone of global natural resource concentration. The politics of interdependence consisted of an elevation of international economic policy in support of Third World designs for a "New International Economic Order" and consequently the relegation of military/defense concerns to subordinate status. The "Non-Aligned" or "Group of 77" at the United Nations nevertheless made clear its objective on the question of mineral control:

> nationalizations effected by States as an expression of their sovereignty in order to safeguard their natural resources, imply that each State is responsible for determining the amount of possible compensation and the way it will be paid and that any disputes which might arise should be settled in accordance with the national legislation of each State.[1]

Second, acceptance of the Third World redesignation of the international economy on a North-South polarity discouraged the assertion of the United States' national self-interest on issues such as the renegotiation of existing mineral agreements, nationalizations, and the emergence of State minerals and mining ownership and control. The strategic implications of the denial of access for American-based multinational mining enterprise were minimized or ignored. Dependency would not lead to vulnerability, it was believed, because the security of the United States as a buyer is maintained by the necessity of the mineral-producer country to perform as the seller. The need of the latter for foreign exchange was supposed to negate the vulnerability of the former as the dependent importer.

To the specialized committees of the American Congress, the media, and several public policy institutes, the reality of widening mineral import dependency had become a central element in the generalized vulnerability of the United States' defense-industrial base. This relationship between defense preparedness and mineral supply dependence exposed a major flaw in the separate compartments strategy of the Carter Administration; an approach that detached South Africa, for example, as a principal source of supply of strategic minerals from its foreign policy of hostility toward that nation. United States dependence on South African strategic mineral supplies in 1979, averaged through the first three years of the Carter Administration, reveals the extent of vulnerability in the case of disruption: Platinum, 82%; Palladium, 43%; Ferromanganese, 43%; Manganese metal, 83%; Manganese ore, 11%; Ferrochrome, 66%; Chrome ore, 46%; Vanadium Pentoxide, 78%.

Threats of sanctions, which were in fact similar in outline to "economic warfare" scenarios, were widely publicized without the national security implications of shortfalls of ferroalloy supply to the United States either in the short or long-term. United States foreign policy had suddenly abandoned the classic parameters of national self-interest in security of supply of vital raw materials from foreign sources. Instead, the new emphasis in the case of South Africa was the extension of domestic norms of "human rights" as a priority link between public opinion and foreign policy. Until the cobalt supply crisis of Zaire erupted in 1978, almost no serious recognition in policy analysis was given to Africa as a minerals supplier to the United States and the West. There were no incentives for individual policy analysts to raise disturbing questions concerning supply security in a milieu which encouraged "North-South" issues and adaptation of the United States to a self-imposed withdrawal from its post-war dominant power position in world affairs.

The invasion of Afghanistan by the Soviet Union in early 1980, therefore, came as a shock; geopolitical analysis was revived. Not only was Persian Gulf oil perceived to be threatened but the Soviet-Cuban presence in Southern Africa was assessed as a potential strategic minerals supply security risk. It was predictable, therefore, that in contrast to the Carter Administration the Reagan campaign challenge during late 1980 would view mineral import dependency and potential vulnerabilities within the context of a global Soviet design to weaken the West both in economic and military terms. As the energy crisis enlarged into a security dimension, a change induced by geopolitical uncertainties after Afghanistan, strategic minerals security of supply emerged as a source of concern in the context of "resource war."[2]

During the inter-presidential period known as the transition, President-elect Reagan appointed a Strategic Minerals Task Force to report to the new Administration on mineral dependence and vulnerability as regards the general welfare and national security of the United States. In contrast to an inconclusive Carter Administration sign-off on its widely criticized effort to establish a national mineral policy, within 14 months of its taking office the Reagan Administration presented a minerals policy and program to the Congress. Directed by a Strategic Materials Working Group, and led by the Interior Department under Secretary James Watt, the announcement of a policy in fact followed several important decisions.

The Reagan Administration moved rapidly on the controversial marine mining provisions of the proposed Law of the Sea Treaty. Although United States defense interests were served by the draft convention, the Department of the Interior, with support from a non-mining, national security cluster of individuals and non-profit public policy institutes was able to convince the President that the ocean mining regime was unacceptable to American interests. In a

final meeting, and with every agency on record with pro/con arguments on the Law of the Sea Treaty, Secretary Watt presented a rejection recommendation through the Cabinet Council on Energy and Natural Resources based on the disadvantages of politicized supra-national authority in control of the future of oceans mining, mandatory technology transfers from private sector mineral investors to State entities, and Soviet Bloc preponderance in the proposed management and decision-making. It would have been inconsistent at the very least if the Reagan Administration, which was opposed to regulatory "overload" in domestic affairs, approved a more extensive version in an international forum.

Confronted with a self-imposed denial of access to deep seabed mineral resources, the Reagan Administration next prepared for a confrontation over on-shore or land usage. From the beginning, the Administration assumed a sufficient level of public support for domestic mineral development as an adjunct of public acceptance of the objectives of "energy independence" -- a response to the OPEC embargo impact of 1973. But mineral deposits are irregular and anomalous; public opinion would have to tolerate an increase of exploration on public land which was withdrawn or under wilderness area review. The issue quickly amplified the structural conflict within the Federal Government; its "landlord-tenant" relationship with potential "users" now extended to the environmentalist movement.

The United States Government owns 720 million acres of the United States -- nearly one/third of the total land area. Since 1960 the Government of the United States has transformed 27 different legislative proposals into laws that restrict or deny mineral extractive activity on public land. Although "multiple use" is still a norm of American land law, it is subject to interpretative decision-making which is open to political intervention through the mobilization of votes in Congress, of specialized committees in Congress, or by way of control through the Executive in the form of a pro-environmentalist Presidency such as that of Carter.

Nearly 70% of public lands are limited or in some manner and degree restricted from the perspective of mineral exploration and development. Even the United States Continental Shelf was 96% inaccessible as late as 1980; not more than 2% had been leased for the purpose of oil and gas exploration and development. This impedance of access to the Continental Shelf suggests that marine mining might be ultimately resisted by the environmentalist movement even though it could partly divert pressure for development from public on-shore lands.

At the beginning of the 1980s the United States was moving towards high-risk minerals import dependency in the event of a three year war because the following conditions prevailed:

1. The availability of public lands for new exploration, development, and production of minerals was diminishing.

2. Soviet Union and surrogate power projection into or adjacent to world mineralized (energy and non-energy) zones.

3. Resource nationalism and the "Group of 77" "sovereign-takes-all" strategies against international minerals companies access and ownership.

4. Foreign producers as state mining enterprises were expanding without traditional supply security predictability.

5. Ocean mining as a source of strategic minerals failure because of the rejection of the Law of the Sea Treaty and unfavorable economics of return to industrialized nation investment despite legal regimes which supported initiatives outside the LOS.

United States reliance upon Canada as a stable source of mineral supply therefore became more critical than at any other time since the 1950s. The strategic position of the United States, therefore, considerably worsened in 1981 when Canada aggressively pursued Canadianization policies within the framework of the New Energy Policy and the Foreign Investment Review Administration. The traditional assumptions of "hemispheric self-sufficiency" in a potential United States national emergency or war were suddenly under attack. What was at stake were deeply integrated United States defense mobilization preparedness planning contingencies which centered on access to Canadian minerals.

It was not certain that Canada was prepared to reactivate assured joint strategic government cooperation which had been institutionalized by treaty or executive agreements since the Second World War. The United States traditional view had not changed despite the Trudeau era:

> "...in the United States the principal items are oil and coal, both sources of energy, and it is quite likely that a considerable percentage of production previously exported would be absorbed by the increased war demands. The same applies to the mineral exports of Canada [italics mine]. The main items in this category are asbestos, aluminum, copper, lead, nickel, platinum, and zinc, all essential raw materials ... in which the United States is faced with a shortage."[3]

But foreign policy disagreements and the Canadianization strategy challenged the United States view that Canada's

raw materials were automatically added to its capability to respond to or initiate certain defense policies where force was probable. Yet, access to Canada in the 1980s and beyond is recognized as a mitigating factor in the long-term decline of the United States mining and minerals industry, apart from the far more significant issue of strategic cooperation during periods of international conflict.

Canadian investment policy precipated the conflict which ultimately involved the reciprocity provisions of the United States Mineral Leasing Act of 1921. It began with the Seagram attempt to take over St. Joe Mineral Corporation. The resistance of the Missouri-based company to the take-over mobilized some members of the United States Congress. Other take-over efforts followed and the outline of the Trudeau strategy became clear to the Congress. Shortly before the Ottawa Summit of mid-1981, the House Oversight Committee (both Democrats and Republicans) forwarded a letter to President Reagan. That letter expressed opposition to the reduction of United States corporate assets in Canada as a result of the Trudeau policy. The ability of Canadian take-over principals to obtain soft credit terms with Canadian banks prompted Republican leadership in the Senate to look for cash parity arrangements between the take-over group from Canada and the defensive American target in the United States.

To the Administration, the primary issue was the nature of the FIRA and the NEP. At the center of the Canadianization policy was the requirement that FIRA review all new foreign direct investment proposals according to the condition that such investment be of "significant benefit to Canada." FIRA had the power to review expansion of foreign firms into unrelated sectors. The addition of <u>performance review</u> to the powers of FIRA suggested to United States policy analysts and industry specialists that Canada had moved closer to a Third World position vis-a-vis foreign natural resource ownership and control. American natural resource companies had long opposed <u>performance review</u> conditions in mineral agreements with Third World nations.

To the Reagan Administration, the National Energy Program (NEP) was more than a mere Canadianization pronouncement. It was rather an ultra-nationalist strategy of "discriminatory investment policy instruments designed to disadvantage foreign-owned firms while financially assisting Canadian-owned firms." Apart from the "Canada Lands" provision which required 50% Canadian-ownership as a prerequisite for participation in the Yukon, Northwest Territories, and off-shore areas, the Petroleum Incentives Program was regarded as particularly destructive to the programmatic direction of the Reagan Administration. The objective, a phase-out of earned depletion allowances in favor of direct subsidies, again 50% Canadian ownership as the precondition, reaffirmed the Congressional usage of "firesale" of United States assets in Canada as the ultimate outcome.

Under considerable pressure from a Congress that was mobilized by American industry under the threat of "unfriendly" acquisition attempts, and given the evidence that FIRA policy had restricted management counter-efforts to prevent the takeover of United States firms, the Reagan Administration was compelled to react. The response involved trade policy structure of the United States government and to a lesser extent natural resources and energy decisionmaking. Throughout the conflict Congressional specialized committee structure, in which the American mining industry had preserved its declining influence, assumed a protective counter-nationalism toward United States natural resources. At the same time, the crisis was perceived as one between governments. Canadian-United States relations reached a "new low" in official Washington terms.

United States corporate natural resource ownership in Canada was an "immediate problem" in the context of "long-term policy issues." The long-term considerations were perceived as the NEP impact upon United States company earnings and asset values; the adverse impact on United States exports to Canada -- 75% of the 300 largest firms in Canada were intracompany or parent-branch transactions; the FIRA rules of localized purchases by United States investors violated the GATT Article III; violation of the national treatment principle established by the OECD. But far more critical to the United States was the danger that Canadian policy, expressed through FIRA and NEP, would establish a precedent for the Third World or the less-developed countries.

The prospect of the Third World following the example of Canada, rather than imposing a new international order upon the industrialized nations from the outside, not only increased United States energy and non-energy mineral supply vulnerability but also disturbed the Reagan policy of global economic reform. Canada was not, after all, a member of the "Group of 77" and the United States viewed Ottawa as responsible for a different kind of commitment to the international economic system. To a considerable extent, United States participation at the 1981 Cancun "development summit" was based on a concession to Prime Minister Trudeau who argued forcefully for a "dialogue" with the Third World. But Reagan and Trudeau were clearly at odds over what the United States concluded was the simulation effect of internal Canadian natural resource and foreign investment policies upon the less-developed countries which are increasingly the off-shore suppliers of raw materials to the United States.

President Reagan devoted more than one-fourth of his announcement to campaign for the Presidency in 1980 to Canada and Mexico. Among his most deeply held and strongest geopolitical expressions is a concept of a North American Accord which is only a slightly modified version of the World War II axiom of "hemispheric self-sufficiency." The Reagan Administration places its highest priority on maintaining good relations with Canada and Mexico. This is

far more than a government-to-government relationship. It is a reality of interdependence which is unalterable -- a determinant of geography and history. Since such inter-American relations are considered in terms of the concept of "neighborhood" -- particularly in the case of Canada with a shared cultural heritage -- the strategic assumption of trans-border access to and investment in natural resources has not been considered as a variable of diplomacy subject to changes in government policies.

It is the objective of the Reagan Administration to terminate inflation and inflationary psychology in the domestic affairs of the United States. From 1980 to the present this objective has been based on the implementation of policies to restore an economic environment which ensures incentives for dynamic and private investment, to expand productivity, and to revive confidence and optimism. At the same time, there are less-widely noticed objectives which, while they involve the United States in a reform of the international economy, are linked to domestic long-term objectives. It is extremely important to the United States that the change in its internal economy promote an open world trade and investment system, the precondition of economic development in the Reagan Administration vision of a global economy.

The largest bilateral trading relationship in the world is the United States and Canada at $77 billion (U.S.) the year before the FIRA and NEP crisis. That volume and the structure of relative freedom in which it exists is understood as a model of a global economic system. To the Reagan Administration, therefore, much more than the $10.5 billion (U.S.) direct U.S. investment in the Canadian energy sector was at stake. Should the NEP force the withdrawal of or freeze U.S. direct investment in Canadian energy, the bilateral volume and content of the model would be diminished. But if Canada and the United States allow the conflict to lead to the import restrictive investment ideology of the North-South hostility, the United States international economic strategy would not survive. Canadian discrimination against United States ownership and control of Canadian natural resources would stimulate a wave of discriminatory behavior against the United States in the Third World. How could the Reagan Administration objective of an open international economy survive the collapse of openess between Canada and United States? How could the United States continue to make consultative progress with Mexico, within the concept of the North American Accord, on the restrictive rules against U.S. investors in terms of performance criteria as a condition for foreign exchange allocation while Canada implements the FIRA and NEP.

The Reagan Administration anticipated that Canada would assume its responsibilities as a "full partner in the leadership of the Free World" as regards the global economic system. Thus, the United States objectives towards Canada were reviewed in mid-1981. First, the primary objective was to terminate discriminatory foreign investment policies.

The mechanism, it was decided, should be diplomatic and legislative. The limitations were understood to be that no action towards Canada should result in extraordinary economic costs or undermine international United States investment policy. Second, and extremely significant, protection of American firms and citizens from economic injury was established as a secondary and short-term objective.

The policy options considered by the Reagan Administration included the following" (1) support for proposed legislation which would increase the margin requirements of foreign buyers of American corporate securities to domestic levels -- Canadian takeover efforts would be neutralized in the sense that the advantages of borrowing funds in Canada without margin requirements would vanish; (2) expand the authority and scope of the Committee on Foreign Investment -- future Canadian investments in the United States would be reviewed with the NEP as a variable in final approval; (3) retaliation by the United States under Section 301 of the Trade Act of 1974 -- President Reagan would take trade-related restrictive action towards Canadian goods and services; (4) deny Canadian firms access to leases on United States public lands on the ground that Canadian NEP and FIRA regimes deprive the United States of reciprocity under the provisions of the Mineral Lands Leasing Act of 1920 -- the Department of Interior should determine whether or not Canada should be considered "reciprocal" in accordance with U.S. law that blocks lease-access to certain minerals including oil and gas.

The Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce (United States House of Representatives) Chairman Rep. John D. Dingell and the Ranking Minority Member, Rep. James T. Broyhill forwarded a letter to President Reagan that stated the Congressional case in June 1981. The letter raised the issue of individual corporate injury because of Canadian action:

> Conoco recently exchanged its 5.29% interest in Hudson's Bay Oil and Gas of Canada for Dome Petroleum of Calgary's recently acquired 22 million Conoco shares plus $245 million. It was economically coerced into doing so under difficult and unfair circumstances caused by Canada's economic nationalism and the lack of adequate response to these policies by our government.

The Subcommittee further recommended direct discussion between President Reagan and Prime Minister Trudeau and announced that it would call Secretary of State Haig and Secretary of the Treasury Regan to a future hearing. But far more important was the bipartisan Subcommittee position that the NEP (in the form proposed) and the behavior of FIRA were direct violations of the reciprocity provision of the Mineral Lands Leasing Act of 1920.

The Administration had decided against new legislation; a margin requirement could at best only prevent some takeover efforts and would not serve the primary objective of deflecting the negative impact of FIRA and the NEP. Thus, the Administration regarded the Subcommittee letter as a threat by the Congress to enact legislation if it did not act. The action of the Reagan Administration had to safeguard strategic mineral access, support the stability of the North American Accord, avoid retaliation or losses in trade, satisfy an aggressively interventionist Congress, and eliminate the negative impact of FIRA and the NEP.

Apart from the adoption a demarche by President Reagan during the mid-1982 meeting with Prime Minister Trudeau, United States strategy concentrated on the reciprocity requirement of the Mineral Lands Leasing Act of 1920. Thus, in selecting this as an instrument of policy, the Administration was able to demonstrate its responsiveness to the Congress and in fact attract support as having endorsed a recommendation by the Subcommittee. This is extremely important to the conflict; it represents not only bipartisan Congressional concern over Canadian actions but also consensus between the Executive Branch and the Congress.

The decision to conduct a review by the Secretary of the Interior as to whether Canada was no longer a reciprocating nation placed the Administration conflict management in the Department of Interior, an agency whose responsibilities fall into the minerals and land management area. Although the conflict was never viewed in the narrow sense of minerals or energy supply or access, the policy process of trade relations nevertheless selected the option that allowed United States government reaction to take place through a mineral leasing retaliatory mechanism. Secretary James Watt was encouraged by Ambassador Brock (Office of Trade Policy) to evaluate both the Canadian FIRA and the NEP.

The Reagan Administration reasoned that the reciprocity review was an action which did not require legislative activity. The Act was flexible enough to restore reciprocity or the status of Canadian investors to obtain leases on U.S. public land in the event of a change in Canadian law and policy. Finally, there was agreement that the MLLA would send a signal to Canada that its actions were considered serious and damaging to U.S. interests. Uncertainties in the Reagan Administration centered around the probabilities that Canadian investment in U.S. energy exploration might be reduced, rules and procedures were too vague in the case of enforcement, and Trudeau could mobilize anti-United States sentiment that would only make him more popular but also would accelerate ultra-nationalist developments in other sectors. The Administration, however, rejected other more stringent options, such as, the cancellation or renegotiation of current bilateral Defense Production Sharing Agreements, a nine-month moratorium on new Canadian investment in the United States, impedance of the completion of the Alaska Natural Gas Transportation

System (pipeline), restraints upon capital flows to Canada through unfavorable regulatory and tax treatment, and an imposition of a countervailing duty upon Canadian exports of petroleum products.

The reciprocity clause of the Minerals Lands Leasing Act (1920) states that the:

> citizens of another country, the laws, customs, or regulations of which, deny similar or like privileges to citizens or corporations of this country, shall not by stock ownership, stock holding, or stock control, own any interest in any lease acquired under the provisions of this Act.

The Department of Interior interpretation of this section in 1981 would decide whether or not Canada was reciprocal. The question was: is it possible for U.S. citizens or corporations to own stock in Canadian companies? If the Department of Interior made a factual determination that it was possible for U.S. citizens or corporations to own, hold or control shares in Canadian corporations, then Canada should be declared reciprocal. However, the United States position could be extended so that while shareholding can be allowed Canada nonetheless could be declared non-reciprocal "if it discriminates against United States interests by precluding or unreasonably restricting a corporation owned in whole or in part by United States interests from participating in the country's mineral resources on its public lands." A 1981 decision by the Assistant Attorney General went further: if Canada or any other country can be found to have restricted ownership by a fraction or a percentage, then the United States can "mirror" that restriction in the application of the MLLA. Finally, if a foreign country makes a distinction between minerals or restricts ownership to nationals in some but not others, the United States can "mirror" such negative aspects of similar or like privileges."

The Secretary of Interior assumed a wide authority to interpret the MLLA and review the reciprocity of Canada. First, the determination commences with a focus on the opportunity of U.S. citizens or corporations to own or control shares in Canadian corporations. No discriminatory barriers should exist against corporations with United States shareholders as regards the access to mineral rights. Second, restrictions that are "unduly restrictive or harsh" can be considered -- nothing less. Third, the Secretary of the Interior can recommend a "mirror" in the application of U.S. responses. Fourth, considerations of direct or indirect ownership, and the potential of nationalization, are elements in a reciprocity review. Lastly, reciprocity can be declared on a mineral-by-mineral basis.

The Department of Commerce made it clear from the beginning

that there were unforeseeable consequences of a non-reciprocal determination. Since that agency is responsible for the promotion of United States foreign investment, there was apprehension that a negative determination would inflict losses on the total structure of direct foreign investment in Canada. The Secretary of Commerce argued for caution in considering or adopting policies that would restrict foreign investment in the United States. Retaliatory countermeasures were always a probable risk. The United States should take no action that would weaken the foreign investor perception of the United States as possessing a secure and stable investment climate. The United States is a massive investor abroad and maximum freedom of investment and capital flows was in its interest.

In short, non-reciprocity against Canada would lead to much higher risk on a macro-investment level. The losses in Canada would be fractional against the potential worldwide losses if the U.S. reversed its foreign investment policy and practices. Above all, the fundamental component in United States trade and investment policy is the principle of national treatment. Under this practice foreign investors must be treated no less favorably than U.S. investors. But Canada's deviation from "national treatment," although unacceptable, nevertheless represented a far smaller loss than that which would occur if the United States international investment structure was suddenly under attack in its totality.

The Secretary of the Interior was restricted to a "factual review" which excluded policy judgements. Moreover, prior to the reciprocity decision the Interior Department determined that Americans could acquire interest in Canadian minerals with the exception of oil and gas. Speculation on the future of Canadian legislation as regards minerals other than oil and gas was ruled irrelevant to the reciprocity decision process.

The critical element in the reciprocity decision was the Interior evaluation that neither the Foreign Investment Review Act (1973) nor the Canada Oil and Gas Production and Conservation Act (1980-81) were pertinent to the criteria of reciprocity. FIRA does not, it was explained, "deny U.S. citizens and corporations the privilege of investing in Canadian oil and gas resources." Based on a review of the FIRA Annual Report no a priori position or behavior to deny such investment in the form of shareholding was evident. The Interior Department did, however, conclude that the effect of the Canada Oil and Gas Production and Conservation Act ownership requirement (50% Canadian) was "discriminatory" towards U.S. citizens and corporations, but not in a "manner" to qualify as information in support of a non-reciprocal determination. The proposed Energy Security Act and its controversial PIP were held to be extraneous to the reciprocity review with the latter defined as the "economic equivalent of a tax credit."

The United States declared Canada fully reciprocal within the ambit of the MLLA on February 2, 1982, with the qualification that reciprocity did not imply tacit approval of Canadian investment policies. The scope of the decision was deliberately narrowed to de-escalate the conflict, as "mirroring" in the case of the COGNA would have been more restrictive than Canadian policy. Non-reciprocity required factual evidence that Canada had restricted U.S. shareholding in Canadian natural resources. It had not.

The Interior Department carefully separated its "fully reciprocal" determination from the United States "serious concern" over Canadian policies and direction. United States strategic mineral supply interests in Canada depended upon the effectiveness of Administration efforts elsewhere to persuade Canada to restore a policy of "open investment in which capital is free to flow among nations to its most efficient use."

The crisis between Canada and the United States exposed the United States to a temporary high-risk strategic minerals supply security problem because it occurred during the uncertainties of Soviet Bloc expansion and Third World natural resource investment radicalization. The assumptions of limited "hemispheric self-sufficiency" were to be no longer taken for granted. The Trudeau period threatened to disrupt the global economic strategy of the United States. In these terms, the conflict provides a basis for future United States policy and contingency planning:

(1) It is imperative that Canadian mining and minerals remain privately owned and controlled because state enterprise is less accessible to strategic interests and more amenable to politicization of natural resources.

(2) United States-Canada trade and interdependence is a higher priority than natural resource ownership discrimination.

(3) In a direct conflict with Canada over natural resource ownership in the context of economic nationalism, the United States will probably not retaliate in a mirror manner but rather will seek adjustment or change through international agreements and fora.

(4) The "North American Accord" of the Reagan Administration reaffirms a United States global strategy in which limited "hemispheric self-sufficiency" is assumed in the event of war with the Soviet Union.

(5) The contraction or eventual demise of United States mineral exploration, development, and production within its frontiers is not viewed as a long-term crisis of national security as long as there is an anticipation of access to Canada and the availability of its production.

FOOTNOTES

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9

THE CANADIAN ROLE
in
AMERICA'S ENERGY FUTURE

by

Milton Copulos

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When one looks at the condition of most of the contemporary world, one cannot help but wonder at the economic miracle which has occurred in North America. Certainly, the North American continent is blessed with bountiful resources, but so too are other regions of the globe. Certainly, the area was first settled at the advent of the industrial revolution, but that fundamental change in the world's economic structure affected the rest of humanity as well. Certainly there have been wars and famines and conflicts during the last three centuries, but North American nations have been involved in them to perhaps an even greater degree than the rest of the world. So what then is the answer? How did this economic renaissance take place? How is that in a few short centuries, we of North America have been able to bring greater economic well-being to more people than anyone else at any other time in mankind's history? More important, how have we been able to accomplish all of this without falling victim to the totalitarian temptation--the trap which enslaves half the world's population?

The answer is simple really. We of North America believe in the Free Market. This is because we recognize the fundamental truth that a man cannot be truly free if he is not free to enjoy the fruits of his labour. Like most fundamental truths, it is something we take for granted--that we assume everyone accepts. Yet, if we look around us, we come to realize how truly unique our system is. More important, we come to appreciate just how well it has served us.

If we stop and think of the last 200 years, and how much our people have progressed, it takes our breath away. By simply following the principles embodied in a Free Market philosophy, we have achieved the unprecedented: a social system wherein men have the opportunity to better themselves not through inheritance, privilege, or the largesse of some potentate, but through merit.

Moreover, by following this path, we have generated material wealth undreamed of in years past. This should come as no surprise though. In the end, it is only the Free Market which allows man to fully realize his ability to create, to innovate, and to produce, and thereby maximize the total amount of material goods available to society as a whole. It is only in a Free Market that the ultimate resource--man's mind--if fully harnessed. Therefore, to the degree that we hinder the operation of Free Markets, all that we really accomplish is to restrict the utilization of each individual's productive ability, and thereby the total amount of material goods a society produces, and that all of its citizens may enjoy.

Nor should we dismiss this advocacy of Free Markets as merely a "shopkeepers mentality". It is not only commercial endeavors that flourish under a Free Market system, but artistic and esthetic endeavors as well. The self-same

freedom which allows individuals to reach the heights of which they are capable in the realm of commerce also allows individuals to achieve similar accomplishments in the arts. Free Markets tolerate no state-approved school of drama, or painting, or dance. Further, the wealth of material goods they produce provide the leisure under which artists can find the freedom they too need to create.

Still, despite the clear evidence garnered from 200 years experience with Free Markets, we find today an ever increasing trend towards ever greater government intervention in the marketplace, and its corresponding erosion of individual and economic freedom. There are those who argue that such regulation is needed, and that any problems which might be surfacing at the present are merely the product of flaws in the regulatory process. They contend that all that is really needed is for government to do a better job of regulating. But, they miss the point.

Government interference in the marketplace may be likened to a clamp on a wheel. While it is true that through some minor adjustment of the clamp, the wheel may be allowed to operate with greater freedom, the more fundamental fact is that the clamp should not be there in the first place. The regulations which seem to spring up at every turn in Canada's energy industry are like that clamp. They too hinder its ability to operate, and regardless of how they are adjusted to make minor improvements in efficiency, the more basic truth is that they shouldn't be there at all. What is even worse, however, is that the growth of Canadian regulatory activity is taking place at the very time that a trend in the opposite direction is well under way in the United States. The danger this poses to the Canadian energy industry cannot be overstated.

As most people are aware, when two engines designed to operate in tandem go out of phase, a danger exists that they will tear each other apart. The U.S. and Canadian economies have long operated in tandem, if you will--with close cooperation between firms on both sides of the borders. However, should the policies which govern the operations of firms on either side of the border grow too far apart, then a real threat to continued cooperation is posed. Just as the two engines could tear each other apart, so too could the two sets of policies tear the bonds of cooperation, hundreds of years old, asunder.

A good example of how conflicting policies can have far-ranging implications is found in the example of natural gas. Those who follow the U.S. natural gas market know that the Congress of the United States is giving serious consideration to measures that will fully lift federal regulatory restrictions from natural gas pricing, and that even if such action is not taken, that under current law a majority of federal gas price controls are set to expire in

1985. The importance of these moves to Canada is found in the fact that the U.S. is Canada's most important foreign gas market, and the logical recipient of it surplus supplies. However, as lucrative as the U.S. market has been to Canadian producers over the years, Canada is now in danger of losing it, not through any lack of willingness of Canadian producers to sell in the U.S., or of any unwillingness of their U.S. customers to buy, but rather due to the pricing policies of the Canadian National Energy Board.

As noted, the U.S. has already made some progress towards eliminating the pernicious government controls which for so long hindered natural gas production, and with great results. The disparities which once existed, with some natural gas selling for as little as 21 cents per thousand cubic feet, while other identical supplies of natural gas were allowed to go for as much as $11, are diminishing, although they are not totally resolved. When they are resolved, the cushion of cheap gas which has allowed the NEB to enforce what amounted to "above market" prices will be gone, and the market for Canadian gas in the lower 48 states of the U.S. could well dry up.

The choice facing Canadian producers will be simple enough: lower prices, or lose the market. In a normal Free Market situation, the response would be obvious--to the extent that it was profitable, Canadian producers would lower the price they charged customers in the U.S., but, there's a catch. Canadian producers, no matter how willing, may not be able to act as they would in a normal market, because the NEB might not let them. In fact, that's exactly what's likely to happen given past experience.

A recent decision by the NEB illustrates its attitude on this problem. As the price of natural gas produced in the U.S. declined, largely as a result of new production spurred by the partial decontrol accomplished to date, utilities in the U.S. came under increasing pressure from their local regulatory authorities to either renegotiate the price of contracts of natural gas with Canadian producers, or to simply stop using Canadian gas altogether. The reason for this pressure was simple enough: while Canada was charging the equivalent of $4.96 U.S. for a thousand cubic feet of gas, the average price from U.S. producers was $2.70. The NEB's response was to lower the Canadian price a token 11 percent to $4.50, hardly enough to satisfy local (U.S.) regulators under intense pressure from their constituents. In short, the NEB would not allow Canadian producers to lower their prices enough to make them competitive, and therefore created a situation which might cost them one of their most important markets. Worse, however, is the fact that this action, or lack of it by the NEB threatens to elicit a response from the U.S. Congress which could even further damage the Canadian gas industry's position in the U.S.

Twice now, legislation has been introduced in Congress which would require that the Secretary of Energy review import licenses granted to Canadian producers and make a determination if the price those producers charged their customers warranted continuation of the license. Although the legislation has not as yet been enacted, it will in all likelihood be re-introduced in 1984, and will have strong support from gas producers in the U.S. who currently are experiencing a surplus of supplies.

Now, obviously, the aim of the legislation is to place pressure on Canadian and Mexican producers who, in the minds of many Members of Congress are charging too much for their natural gas. Although everyone breathed a sigh of relief when Congress adjourned without acting on the measure, the threat it contained is real. With a surplus estimated at as much as 20 percent of domestic requirements, U.S. producers are more than capable of making up any loss of foreign supplies for some time. Continued high prices for imports would virtually assure that they do. Still, in such an unhappy circumstance, everyone would lose. U.S. producers would end up exhausting current domestic supplies prematurely, and Canadian producers would lose badly needed revenue. Most important, the cordial and mutually profitable relationships which have for so long characterized the business dealings of U.S. and Canadian industry firms would have suffered a severe blow.

It is not just in the area of natural gas, however that Canadian and U.S. energy relations are potentially strained. Another concerns the sale of uranium produced in Canada to customers in the U.S. Senior Republican Members of the Senate are extremely concerned by charges from the U.S. mining industry that Canadian producers are dumping uranium in the U.S. One of them, Senator Domenici has introduced legislation which would set quotas for the amount of uranium that could be exported to the U.S. by foreign firms, and there is considerable support for such legislation in some quarters of the mining industry. His concerns were bolstered by complaints from other uranium producing nations containing the same allegations. At the heart of his arguments on this is a truly disturbing implication: that in times of crisis, Canada cannot be considered a reliable supplier, and that therefore, the U.S. should not allow itself to become overly dependent on Canada as a source of uranium supplies. Even more disturbing is the fact that this is not the only quarter in which Canada's reliability is being questioned.

In the area of hydroelectric power, a major source of commerce between Canada and the United States, there is increasing concern being expressed in the Congress over Canadian price policies, and over Canada's reliability as a supplier. Such fears are not diminished by rumors that some in the Canadian government believe that energy commerce with the U.S. should be used as a tool for placing political pressure on Washington in areas of foreign policy concern.

In the end such tactics would inevitably backfire, and would open a Pandora's box of mischief for Canadian/U.S. relations on a host of fronts.

Other areas which hold the potential for causing great strains in relations between our two nations concern the issue of title to mineral Lands under various Canadian Federal and Provincial Mining Legislation and the issue of the Foreign Investment Review Act which are causing fears that changes in the provisions of such legislation may lead to the eventual nationalization of U.S. firms operating in Canada. Private Canadian firms have already, in the view of some U.S. energy officials, been used as a tool to force out their U.S. partners, through the provision of subsidized loans, and other governmental initiatives. It is just a small step from that, in their view, to the outright takeover of foreign firms operating in Canada. It was exactly this sort of concern that led to reviews of the provisions of the 1920 U.S. Mineral Leasing Act during the past year. Although no action was taken under that act by Interior Secretary Watt, the fact remains that its provisions could be used to retaliate against Canada should the Canadian government move against firms from the lower 48.

Ironically, the legislative initiatives, and reviews of current law taking place in the U.S. are not a reflection of any desire on the part of the U.S. government or energy industry to dictate to their Canadian counterparts. Rather they grow out of a fear that their Canadian counterparts are attempting to dictate to them. More and more, the perception in the United States is that the Canadian government is hostile to U.S. investments within her borders, and that the climate for mutual cooperation is undergoing a period of decided chill. As this perception becomes more engrained, it will likely follow that a corresponding flight of U.S. capital from Canada will occur, and with that flight will come all of the negative impacts that one could imagine.

Workers would be laid off, factories would close, and protective tariffs as onerous as those imposed just prior to the Great Depression could be put in place. Retaliatory taxes of all kinds could be imposed. More than a hundred years of economic cooperation could be erased in the wink of an eye. Worst of all, the traditionally cordial relations between our two nations could be strained to the breaking point.

It would be a grave mistake to underestimate the extent to which the fires of nationalism are burning in the American public's mind today. A succession of recent events, ranging from the reaction to the downing of the Korean Airliner to the invasion of Grenada have all contributed to this new manifestation of national will, but those events were really only the visible manifestation of a sentiment that has been

growing for some time. America has finally put the crisis of confidence which followed the Vietnam War behind it, and has decided to reassert its position in the world once again. This new expression of national will is likely to evidence itself in a number of ways, not the least of which may be the call by legislators who find it expedient to impose more and more protectionism on our trade relations.

There is a widespread sentiment among the American public that it is being taken advantage of by other nations in the international trade arena. Whether right or wrong, the fact is that this perception is unmistakeable. At present, this perception is aimed mainly at Japan, but the imposition of protectionist policies by the Canadian government could soon cause it to spread to Canada as well. If it does, then the protectionist measures of the 1930's will seem mild compared to what is likely to follow.

This grim view of the future, however, need not come to pass. Instead, there is another road which may be traveled, a road which inevitably will lead to enhanced prosperity, increased harmony, and the fulfillment of the enormous potential of the North American continent. It is a path which requires travelers to engage in an act of faith, but once done, promises a better future for all. The road, quite simply is the Free Market, and the act of faith the simple belief that Free Markets can work. I should not understate the difficulty of embarking on this path. Both in the U.S. and in Canada, government has shown an aversion to Free Market solutions to problems in recent decades--perhaps because the only thing Free Market solutions require of government is that it get the hell out of the way. Still, it is only through the Free Market that the hope that our two great nations hold out to the rest of the world can ever be fulfilled.

Just think, if you will of the potential of the North American continent once its vast human and physical resources are really unfettered. Our children could experience a future undreamed of in human experience. A future where each individual is allowed to soar to the heights of which they are capable. A future where disease, starvation, and poverty are unknown. A future marked by a burning light of freedom so strong it will stand as a beacon to the rest of the world bringing hope to the oppressed, and succor to the downtrodden. A future that would stand as an example of what free men working in Free Markets are capable of.

No it won't be easy. There are too many decades of regulation, too many legislative barriers too much bureaucratic inertia to overcome in an instant. But, nothing worth having comes easy. Still, even though we in the U.S., and you, in Canada have a long way to go, we have not nearly as far to go as other nations. More important, we are fortunate enough to live under political systems where it is still possible to choose the course of freedom.

In the U.S., we have already begun to make that choice, and to take some faltering steps in that direction. Granted, we have made mistakes, and undoubtedly will make more, but there has been real progress too.

If all goes well, by the end of 1984, all energy sources produced in the U.S. will finally be deregulated. Also, the trend towards opening up our public lands will continue and even accelerate. Our tax policies are under review, and hopefully, tax rates will be reduced from their present confiscatory levels. (A sign of public dissatisfaction with increasing tax rates was the recent recall of two Michigan State Senators who voted for a tax increase, and the fact that more than 750,000 signatures have been collected in an effort to recall the governor of that state.) Regulations are under review at the federal level with an eye towards eliminating as many as possible and simplyfying those found necessary. Most of all there is a committment in the present administration to continue to pare the size of the government, and to bring its functions to levels closer to the people. A committment which hopefully will continue for another four years. Part and parcel of that committment is a corresponding committment to free trade, which opens the door for even greater cooperation between Canada and the United States--providing that our engines are not out of phase, and there's the rub.

If Canada is to be a participant in the inevitable trade bonanza which will accompany the revitalization of the U.S. economy under a new, Free Market discipline, then the Canadian government should look to those areas where its regulations hinder the ability of Canadian firms to compete and cooperate with firms in the U.S. Free trade can only exist if it is free on both sides, and there remains the danger of protectionism both with the U.S. and in Canada. In many ways, - Canada has more to gain from free trade than the U.S., after all, the more than 230 million citizens of the U.S. constitute the single largest consumer market on the globe. It is a market that will remain open to Canada, as long as the policies that Canada pursues allow it to do so. For the energy industry, this is particularly important, for the coming economic revitalization of the U.S. will require energy in all its forms, and in huge amounts. Although the U.S. will likely be capable of meeting its own requirements, there is no economic reason for it to do so. If Canadian energy producers are competitive with their U.S. counterparts, then they can rest assured that a portion of the U.S. market will be theirs. But, what then need Canada do?

Although I would not be bold as to dictate specifics, those are for your own legislators and specialists to develop, I can offer a few suggestions that are the product of our own experience in the U.S., philosophical guidelines, if you will, that may serve to help you in your efforts. First, do

not panic. Nothing is ever as bad as it seems. There is always a tendency to overreact in government, and to propose some new regime for every problem, but anything decided in panic is likely to be wrong. Arising from this first notion, is another: the best solution to most problems is to do nothing. It is amazing how effective a policy of benign neglect can be. Third, assume nothing. Those things we assume as often as not turn out to be incorrect. If we stop and think, we would realize that when we accpet an unproven assumption, what we are really doing is proceeding to make a decision in the absence of information. This is neither responsible, nor particularly effective. In fact, the only thing you can really assume is that anything you accept as an assumption without first checking to make sure it is correct, will likely be wrong. Fourth, take risks. In the U.S., we have a saying, "You have to play to win." This is particularly true in the world of commerce. If you don't take risks, then the really large rewards will never be yours. That, incidentally, is one reason to keep government as far away from the process as possible. Governments by their nature are risk-averse--cautious-- and therefore will normally opt for the status quo. The only trouble with that approach is that it insures stagnation, something that no thriving economy can stand for long.

Finally, I would warn you not to pay attention to the conventional wisdom -- to those things that "everyone says", becuase they inevitably are wrong. The conventional wisdom is really the product of the risk averters, the people who don't want to take the chance of looking foolish by separating themselves from the pack. This herd mentality which is so common in both our societies is something we must always guard against, because it is the conventional wisdom that creates the bonds which ultimately fetter the intellect. It is just these bonds that will keep you from achieving the heights of which you are capable. More important, though, in virtually every circumstance, the conventional wisdom is proven wrong. If you have any doubts, I need only remind you of a few examples. It was not all that long ago that the conventional wisdom held that by the end of 1982, Gasoline prices would exceed $2 per gallon in the U.S., that the Washington Redskins football team could never win the Super Bowl, and that they certainly couldn't come back the following year and win their division, and that a person who was principally known as an actor in low-budget motion pictures could never become President of the United States.

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CANADIAN NONFUEL MINERAL POLICIES AND THE GLOBAL RESOURCE WAR

by

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I believe that the United States and its allies in Western Europe, Japan, and Canada face the possibility of a "mineral crisis" which could be even more severe than the "energy crisis" -- something we are all familiar with. Too few business, industry and government leaders are aware of the magnitude, the complexity, and the urgency of the problem. Indeed, in the United States, the national ignorance regarding America's increasing reliance on imported sources of critical and strategic nonfuel minerals and various processed materials, parallels the pre-1973 situation when few were aware of national vulnerability to cut-offs in petroleum imports.

Some people like to refer to a "resource war". Other people like to refer to a resources competition in the world, a competition involving not just nonfuel minerals but also materials and petroleum. In a period when there are global surpluses of most nonfuel mineral commodities, it may seem odd that anyone should be talking about future nonfuel minerals availability problems, but that is exactly what I am doing, for I believe that the economic well-being and security of all the countries of the West are dependent upon the longterm availability of critical and strategic minerals and materials. Moreover, I believe that this availability over the long term is indeed threatened.

Minerals are things like manganese, cobalt, chromium, and platinum group metals. Mr. E.F. "Andy" Andrews, Vice President for Materials and Services with Allegheny International Inc. in Pittsburgh, has stated: "Without chromium and cobalt, we could not build a jet engine, build an automobile, run a train, build an oil refinery, or build a nuclear or conventional power station...we could not build a computer, cutting tool, mine tool, magnet, or process crude oil, just to mention a few things." Further, manganese is essential in the making of steel. And platinum group metals are vital as catalysts, for example, in catalytic converters used to control automobile emissions.

Let me note here that, even though we face the prospect of a "minerals crisis," the world is not about to "run out" of nonfuel minerals. Present world reserves should meet world demand for most minerals for centuries to come. But since minerals are unevenly distributed around the globe, the problem is assuring access to sufficient quantities of minerals, of adequate quality, at reasonably stable prices, and at time of need.

Let us get specific and talk about nonfuel minerals import dependency of the United States as well as Canada. The United States, even though minerals-rich, is dangerously reliant on foreign sources for at lease 23 of 36 minerals deemed by the U.S. government to be essential to America's overall industrial, technical and economic base. By "dangerously reliant" the U.S. government means relying on

imports for 50% or more of U.S. total demand. For example, concerning manganese, cobalt, chromium, and platinum group metals, the United States imports almost 100 percent of its needs. Put another way, the United States has no active domestic production of these four commodities.

Manganese, cobalt, chromium, and platinum group metals are of particular concern because by far the major production areas are in volatile southern Africa -- primarily Zaire, neighboring Zambia, in Zimbabwe, and especially in the minerals treasure house, South Africa. These countries are variously racked by Marxist insurgencies, internal strife, high inflation, economic recession, and so on. There is one other major source for these four minerals -- the Soviet Union. The USSR has been largely self-sufficient in these same critical and strategic minerals concerning which the United States is almost wholly import-dependent.

As to other nonfuel minerals heavily imported by the United States, supply sources are usually more diversified than those for the "big four" that I have been discussing. Thus, the United States must also import

- -- 93 to 100 percent of its columbium, sheet mica, strontium, tantalum, bauxite, and alumina.
- -- Over 75 percent of its asbestos, fluorine, tin, and nickel.
- -- And over 50 percent of its cadmium, zinc, potassium, selenium, mercury, gold, and tungsten.

It is widely known that Japan and the nations of Western Europe are not minerals-rich and are import-dependent for a great many more nonfuel minerals than is the United States. But what about Canada, which is also one of the Western allies? Some people who deny the existence of a "resource war,: or who at least minimize its significance, point to Canada as an important "safety valve" in terms of meeting the nonfuel minerals needs of the United States and other allies. Emphasis is placed on Canada's status as a major world producer of nonfuel minerals, and on Canada's reliability as a supplier to the United States and to other markets. I am reminded of remarks made by Judy Erola, Canadian Minister of State for Mines, made on October 11, 1982, at the 1982 American Mining Congress International Mining Show, Las Vegas, Nevada. Referring to the nonfuel minerals policy for the United States announced by President Reagan in April 1982, Ms. Erola Stated:

> "..I was struck by the preoccupation with security of supply that was evident in that document. I would like to emphasize that Canada has been a major, and reliable, source of minerals for the United States for decades. We are proud of that record, and we plan to continue to supply minerals for your economy."

Canada is indeed a major world producter of nonfuel minerals, as noted in the 1982 publication, Mining in Canada "Facts and Figures," prepared by the Mining Association of

Canada. The following facts refer to the extraction and production of metallics, non-metallics, and industrial minerals, through to the end of the smelting/refining stage, but not to petroleum and natural gas:

-- In Canada there are about 280 operating mines, some 230 mills, 16 smelters, and 15 refineries.
-- Some 50 different commodities are produced.
-- Canada is the Western World's leading producer of asbestos, nickel, potash, and zinc; it is the second largest producer of columbium, gold, gypsum, molybdenum, and uranium.
-- Canadian mining production value in 1981 was $15.1 billion Canadian (and $14.8 billion in 1980).
-- The value of exports of crude metals and non-metals rose to $6.8 billion from $6.5 billion in 1980. Fabricated mineral products were exported to a value of $9.3 billion, compared to $9.5 billion in 1980.
-- Canada's principal mineral customer was the United States, which imported in 1981 $2.0 billion worth of crude minerals and $7.0 billion of fabricated minerals, or 55.8 percent of Canada's mining exports. Japan was Canada's second leading importer, purchasing a total of $1.7 billion of Canada's minerals (10.5 percent of mining exports).

Certainly Canada is a major supplier to the United States of many different nonfuel minerals. But, to what degree can Canada supply those minerals concerning which the United States is particularly import-dependent? We must answer by pointing out that Canada, like the United States, is not only minerals-rich but also heavily import-dependent for a great many nonfuel minerals. According to a 1981 Department of Energy, Mines and resources (EMR) report, Canada's net import reliance on selected minerals was estimated to be as follows in 1979:

100 percent:

bauxite
beryllium (all forms)
boron
bromine
chromium (ores and concentrates, and ferrochromium)
columbium (metal, ferrocolumbium)
feldspar
fluorspar and natural cryolite
gallium
lithium (all forms)
manganese (ores and concentrates and metal only)
mercury
phosphate rock
platinum group metals (finished forms)
rare earths
rhenium (refined form)
stronium
tantalum (metal, ferrotantalum, and other alloys).

100 percent

germanium (primary and fabricated forms)
graphite
industrial diamonds (natural)

iodine

kyanite

lightweight aggregates (perlite, pumice, and vermiculite)

96 percent
magnesite
95 percent
diatomite

tin (refined forms)
90 percent
clays (fire, china only)

thallium

thorium (nitrate)
titanium (metal only)
tungsten (ferrotungsten only)
vanadium (vanadium pentoxide and metal only)
zirconium (zircon and alloys)

75 percent
bentonite
70 percent
mica (blocks and shed, ground)

54 percent
ball clay
50 percent
antimony

Of particular interest in the context of this paper is Canada's 100 percent import dependency on bauxite; chromium ores and concentrates, and ferrochromium; columbium metal and ferrocolumbium; manganese ores and concentrates, and metal; finished forms of platinum group metals; tantalum metal, ferrotantalum; and titanium metal. An important factor in minerals and materials availability is, of course, not just the presence of raw ores, but also the ability to process the ores into more advanced forms. For example, in 1979, Canada was producing platinum group metal concentrates, but they had to be refined in other nations. As we will comment with regard to the United States, the decline in America's general capacity to process minerals is of great concern. It seems that anyone interested in Canada's long-term role as a supplier of nonfuel minerals to the United States needs to pay attention to the long-term viability of not just the Canadian mining industry in general but the processing industry in particular.

It is recognized that the figures just cited were for 1979, but I understand that the situation is about the same today in most cases. In any case, it is not my purpose to detail all of the strategic and critical nonfuel minerals in their various forms which Canada is today producing and perhaps exporting. My purpose is to underscore that Canada cannot meet its own needs concerning a number of critical and strategic nonfuel minerals in this or that form. Thus, in 1979, Canada was not producing finished forms of platinum group metals, or ferrochromium. Take the case of cobalt.Canada does produce cobalt. The U.S. Bureau of Mines reported that in 1981 Canada produced some 2,500 short tons out of a total world production of about 34,000 short tons.

The United States consumed about 6,000 short tons of cobalt in 1981, with over 60 percent of that originating in Zaire and Zambia. It is certainly conceivable that, in the even of a global emergency situation, Canada could become a significant supplier of cobalt to the United States.

It thus seems clear that not only the United States but also Canada should be concerned about the problem of nonfuel minerals import dependency. Both nations must be deeply concerned, because the mutual heavy minerals import dependency makes us vulnerable to supply cut-offs, or at least to the harmful impacts of sharp rises in the prices of mineral commodities.

For example, an industry-wide survey in 1978 by Chancellor Schmidt's government in West Germany concluded that under static conditions and without allowing for emergency substitution and recycling, a 30 percent reduction of chromium imports in one year could reduce their total Gross National Product by as much as 25 percent. This admittedly theoretical study strongly suggests a need for industry and government executives in the Western industrial democracies to ask themselves what can be done about the nonfuel minerals import dependency problem. A 1981 report by the Washington D.C. - based Heritage Foundation - entitled Strategic Minerals: The Economic Impact of Supply Disruption, by economists James T. Bennett and Walter E. Williams, concluded that one million American jobs might be lost if chromium imports from the Republic of South Africa were severed.

What about this matter of the so-called "resource war"? In this post-detente era, since the Soviet invasion of Afghanistan and the brutal imposition of marital law in Poland, it is important for us to recall that since the time of Lenin, the Soviets have had the stated goal of undermining the Western industrial democracies by cutting off access to raw materials from the less-developed countries. It is my view that Soviet interest in disrupting Western access to Third World sources of energy and nonfuel minerals has been a major impetus behind active Soviet support for so-called "wars of national liberation" in resource-rich Third World areas in the last several decades. Whether targeting resources themselves, or targeting strategic choke points near which Western shipping must transport raw materials, the Soviets have clearly had resource considerations in mind as they have helped install puppet regimes or highly friendly governments in so many Third World countries -- such as Cuba, Angola, Mozambique, South Yemen, Ethiopia, Grenada, Nicaragua, Afghanistan, and Zimbabwe. Plus, the Soviets are major backers of Markist insurgencies presently operating against resource-rich countries in areas like the Western Sahara and Morocco, the Persian Gulf states, Iran, Southeast Asia, Namibia, and the Republic of South Africa -- often called the Persian Gulf of minerals. In addition, the Marxist insurgencies in El Salvador and Guatemala and the subversive activities Cuba, Nicaragua and Grenada threaten the rich oil resources in

Mexico and Guatemala, and threaten ability of ships to transport nonfuel raw materials through the Caribbean basin.

There are, of course, a number of organizations and individuals that minimize or denigrate the likelihood of, or the harmful impacts of, any disruption in the flow of imported nonfuel minerals into the United States as well as Canada. Nonetheless, it is my view that, indeed, a "resource war" is underway in the world. It threatens to severely disrupt our economic well-being and our security. The resource war is far more subtle, and complex, than most Westerners would believe, but there can be no doubt that it is underway. How can anyone deny that other nations far beyond North America have a hold on our economic "throttles"? There is no way of hiding from the very real potentials for severe disruptions in our supplies of certain highly critical imported nonfuel minerals -- not to mention similarly vulnerable Western supplies of petroleum which must transverse the Cape of Good Hope around the southern tip of Africa -- or go through the Caribbean and the Isthmus of Panama -- or through the strategic straits of Southeast Asia.

Our supplies of nonfuel minerals from southern Africa and elsewhere may be subjected to nationalization, expropriation, price manipulation, non-market barter, sabotage, terrorism, and in some cases, cartel action. You may recall that when Soviet-based Katanganese irregular troops invaded Zaire's cobalt-rich Shaba Province in 1978, the attack played a role in causing the price of cobalt to rise from $6.85 per pound to $25.00 per pound. In the spot market, the price shot up to $50.00 per pound. The price of cobalt is down again, but what will the future bring?

Of special concern is the trend toward government ownership of mining in the Third World and the decrease in Western control over world mining and decisionmaking. I appreciate the desires of Third World developing nations to exercise control over their natural resources as much as possible, just as I appreciate the desires of the present government in Ottawa to decrease foreign ownership in a number of Canadian resource investment areas. But it is important to look at the long term minerals availability consequences of government actions in all nations, including the United States.

I take no solace in the hope, held by some, that Third World nations that produce minerals -- even if run by radical or Marxist regimes -- have to sell their minerals to the West to obtain foreign currency earnings. Certainly the West is now the major customer. However, raw materials purchasing managers and strategic planners in the West must be very wary of the possible terms which a Marxist government in, say Pretoria, South Africa, might insist upon, perhaps in collaboration with Moscow. And Western planners must likewise question how efficiently a Marxist-run government can continue to operate its mines and meet export commitments. The continuing economic decline and political

instability in Prime Minister Robert Mugabe's Marxist Zimbabwe -- the former Rhodesia which became independent some three years ago -- is noteworthy. Besides the continuing strife between differing black factions, and the large-scale flight of experienced white mine technical people, the government is taking over effective control of the still largely Western-owned private mining industry in Zimbabwe, and has announced that socialism will ultimately replace free enterprise as a way of doing business. Any expansion of socialism in resources-rich nations, whether among developing or developed nations, must be viewed as a setback for those in the West who desire maximum operation of market forces in determining raw materials availability.

Further, I once spent several years studying and identifying ways to deal with terrorism, sabotage and other forms of political violence in places like Latin America, Southeast Asian, and Africa. It is clear to me -- having visited South Africa and a number of Third World countries -- that a series of well-placed explosive charges on mining and processing facilities, and especially on highly exposed rail routes, could severely disrupt the flow of minerals out of minerals-producing countries in Latin America, Asia, and Africa.

I suggested the need to look closely at the policies of governments relating to nonfuel minerals. Let me first briefly look at the Reagan Administration in Washington. This Administration has generally recognized that the United States is vulnerable to cut-offs in imported minerals, or at least to sharp price escalations. President Reagan sent to the Congress his policy recommendations concerning nonfuel minerals and materials on April 5, 1982. In his cover memorandum to the Congress, President Reagan stated:

> I am pleased to submit the National Materials and Minerals Program Plan and Report to Congress.... This national minerals policy recognizes: the critical role of minerals to our economy, national defense, and standard of living; the vast, unknown and untapped mineral wealth of America and the need to keep the public's land open to appropriate mineral exploration and development; the critical role of government is altering the Nation to minerals issues and ensuring that national decisionmakers take into account the impact of their decisions on minerals policy; and the need for long-term, high potential pay-off research activity of wide generic application to imporve and augment domesticallymaterials. This policy is responsive to America's need for measures to diminish minerals vulnerability by allowing private enterprise to preserve and expand our minerals and materials economy.

I believe that, generally speaking, the Administration is to be commended for the initiatives that the President outlined. He spoke of planned government initiatives in four main areas: (1) opening up more public lands to minerals exploration and development, while preserving the environment; (2) improving the government's capabilities for collecting and analyzing minerals and materials data; (3) taking steps to improve minerals and materials research and development; and, (4) upgrading the National Defense Stockpile.

The stockpile is quantitatively and qualitatively deficient concerning a great many of the most critical and strategic minerals. Many of the some 100 items in the stockpile are not of sufficient quality to meet current, often more sophisticated technical standards. Also, the minerals in the stockpile often are in the raw or ore form instead of the processed form. This is of great concern because, in the event of a national emergency, the ore often could not be used. Take the case of critically important manganese and chromium, which in a great many critical applications, must be used in an alloy form, ferromanganese or ferrochromium. But America's ferroalloy industry is about to close up shop, with most of the processing capacity having been driven overseas.

Why is America's ferroalloy's industry, and so many other basic industries, having problems? Some reasons include: onerous government regulations; high energy costs; heavy expenditures for pollution abatement that do not contribute to productivity growth; exploding labour costs; U.S. governments tax policy that does not adequately encourage capital investment; and, in many cases, government-subsidized foreign competition.

It should be noted that the Reagan Administration's April 5, 1982 minerals and materials message was quite general in nature, did not contain specific legislative proposals, and did not suggest what money the Administration would spend to support the various initiatives. Further, despite the steps outlined which I feel are very much in the right direction, these policy initiatives of the Reagan Administration do not go far enough to comprise a comprehensive and coherent national minerals and materials policy.

The Reagan administration appears to be putting too muchfaith in the President's economic recovery and tax initiatives. With the economy still in such bad condition, and in view of the budget battles in Washington, it is far from clear whether a significant economic recovery will come any tine soon. But even if the U.S. economy does markedly improve, such improvement will do little to deal with many of the major problem areas concerning America's sharply eroded industrial base. For example, economic recovery could not quickly revive the crippled ferroalloy industry, the steel industry, nor the foundry industry. The same goes for the domestic industries -- such as copper, zinc, and lead.

The Reagan Administration's Minerals and Materials policy statement of April 5, 1982, also did not treat the plight of the U.S. domestic processing industry. This industry is increasingly being located overseas because firms cannot make a profit at home. Foreign competition is consistently enlarging its share of the processing market. It is, as indicated earlier, dangerous for a nation to have to rely on overseas sources to process ores, whether mined abroad or at home. What good does it do, for example, to have raw ore stockpiled if, in the event of a global emergency, there is insufficient domestic processing capacity to do anything with the raw ore?

Another major deficiency in the Reagan policy or plan is that it inadequately addresses the special problem posed by the "big four" minerals mentioned earlier -- manganese, cobalt, chromium, and platinum group metals. The United States is almost 100 percent import-dependent for these especially critical minerals, and yet the stockpile is short of its goal. And although in the last year the Reagan Administration has begun efforts to upgrade the stockpile, these efforts cannot offer the necessary degree of relief any time soon. Further, recycling possibilities are limited, and substitution possibilities are unknown in a number of applications, concerning these "big four" minerals. For example, stainless steel, an alloy that is vital in making aircraft, cannot be built without chromium. Or, certain uses of cobalt in high-temperature jet engines do not lend themselves to substitution. It is true that there is much manganese and cobalt on the ocean floors. But the cost would be tremendous, the technology is still to be perfected, and the lead time would be a decade-plus. As if such factors were not enough, there is also, at least in the view of key U.S. and other Western mining companies, no satisfactory investment climate and legal regime for ocean mining. Thus ocean mining is a long-term solution at best.

In another problem area concerning the Reagan Administration's policy, the preoccupation with the stockpile fails to treat the unfortunate reality that Western Europe, Japan, and Canada do not maintain significant strategic stockpiles.

Japan, Britain, France, and some of the other Western allieshave initiated efforts to create stockpiles of strategic minerals; however, these efforts are designed at present to provide relief for matters of days, whereas the U.S. stock-pile is designed to provide relief in the event of a multiyear emergency situation. In view, then, of the relatively insignificant stockpiling on the part of U.S. allies for the foreseeable future, what are the implica-tions? Even if the United States ever got its stockpile fully up to snuff in terms of numerical goals, and in terms of quality -- a highly unlikely scenario in view of the tremendous cost requirements -- what about the minerals needs of U.S. allies in time of emergency? Would not the United States be bound to come to their rescue? Do not all the allies have to hang together in the event of a global

emergency? It seems that some careful thinking, and planning, is very much needed in this area.

In the year since President Reagan introduced his so-called "Materials and Minerals Program Plan," not a great deal has happened to improve the condition of the domestic U.S. mining industry. The U.S. mining industry, like the global mining industry in general, is severely depressed. In fact, the U.S. mining industry was quite unhealthy even before the present world recession picked up steam.

Regardless of the scope and speed of the economic recovery, the United States will still have to deal with a declining domestic mining industry, and the broader problem of an eroded industrial base -- all exacerbated by nonfuel minerals and materials import dependency.

Let us turn now to Canadian policy. First, Canadian officials are clearly aware of their nation's nonfuel minerals import dependency. Besides publicizing the Canadian import dependency figures noted earlier, Ottawa's Department of Energy, Mines and Resources (EMR) has prepared a priority listing of imported minerals. As reflected in an August 1981 EMR paper, "Canada's Dependence on Imported Minerals and Metals -- The Issues," EMR obtained the judgement of some 60 selected professionals and designated for "highest priority" attention these commodities: aluminum, (bauxite and alumina), bentonite, chromium, fluorspar, industrial diamonds, manganese, phosphate rock, and tin. Zirconium was also identified as meriting high-priority consideration because it is an indispensable component of the CANDU nuclear reactor. The EMR paper noted: "None of these materials are now mined in Canada, with the exception of certain amounts of bentonite (of a kind unsuitable for pelletizing purposes) and minor amounts of tin."

Similarly, noted the paper, EMR designated for "medium priority" these commodities: cobalt (superalloys), mercury, nickel (high-nickel alloys), platinum group metals (primary metals and fabricated forms), silicon (silica sand),titanium (metal/rods, bars), tungsten (ferrotungsten and carbide), and vanadium (ferrovanadium and oxide). "Although crude forms of most of these materials are now mined in Canada, no domestic production facilities exist for most of the further-processed forms specified."

The EMR paper also said the department was going to conduct detailed studies on several of the high-priority minerals, considering both possible short-to-medium-term plans for coping with a supply disruption, and possible long-term strategies for reducing, or eliminating, Canada's dependence on imports for strategic minerals. Short-to-medium-term actions to be studied include government controls, reduced use, substitution, stockpiling, alternative foreign sources, and bilateral or "swap" arrangements. Long-term actions being studied include development of new materials, and finding alternative domestic sources.

The summary of the 1981 EMR paper noted:

1. Canadian industry is potentially vulnerable to supply disruptions of some 50 minerals and metals which are imported to some degree.

2. The degree of risk of supply disruptions for any single commodity depends on the country of origin and the countries through which the minerals pass for processing before arriving in usable form in Canada.

3. In-depth studies on individual commodities are being conducted in EMR to provide policy guidance for the government to prepare for possible supply disruptions.

4. Where studies indicate that R&D should be carried out so that "on the shelf" technology is available in case of an emergency, CANMET should take on the responsibility for such R&D.

5. There is a need for clarification of roles to be played, actions to be taken, and the timing of actions, by officials in EMR, in case of supply disruptions.

In the important EMR document, Mineral Policy: A Discussion Paper, dated December 1981 but which was not publicly released until March 1982, twelve pages are devoted to "Security of Supply" for Canada. This section discussed the Canadian nonfuel minerals import dependency situation as discussed above but went far to minimize any dangers to Canada from supply disruptions. Starting with a list of 76 mineral commodities for which "an apparent import reliance exists," the discussion step-by-step reduced the number of commodities which were deemed worthy of detailed consideration. The final list included just six: manganese, chromium, industrial diamonds, titanium, vanadium, and zirconium.

By pointing to various supply, substitution and other alternatives, this list was ultimately trimmed in the discussion to only two commodities as "candidates for detailed consideration": manganese and chromium, in that order of importance. The EMR mineral policy discussion paper stated: "Detailed studies are needed to determine Canada's vulnerability to shortages of manganese and chromium, the potential impact of such shortages, and the most cost-effective response." Like the United States, Canada has low-grade deposits of both manganese and chromium, which are presently not being mined. The EMR discussion paper did not seem to express urgency concerning the manganese and chromium import dependency situations and noted that possible actions to reduce vulnerability to supply disruptions would be studied.

We have thus pointed out that Canada cannot be looked to by the United States as a "safety valve" source of those commodities concerning which America is most import-dependent -- especially manganese and chromium. But what about the ability of Canada to serve as a long-term supplier of other nonfuel minerals to the United States -- for example, of nickel and zinc, concerning which Canada has massive deposits? What we are talking about is the long-term viability of the whole Canadian mining industry. In the case of the American mining industry, one can ask whether it will ever fully recover, or will market shares be permanently lost? And even if production of ores in the United States achieves a strong comeback, will there by any processing facilities left.

It is beyond the scope of this paper to comment on the sad plight of the U.S. mining industry, much less of the Canadian mining industry. In any case, the depressed conditions are well-known to minerals and materials professionals. But having outlined the Reagan Administration's main approaches to minerals and materials matters, it is appropriate here to comment on Canada's broad federal mineral policy. Although jurisdiction over mineral resources in Canada rests with the provinces, federal policy is nonetheless crucially important to the long-term health of the Canadian mining industry.

The aforementioned Mineral Policy: A Discussion Paper, released on March 8, 1982, by Judy Erola, Minister of State (Mines), sets forth what the federal government of Prime Minister Pierre Trudeau has in mind for Canadian nonfuel existing and potential investors -- both Canadian and foreign -- in Canadian mining. The 1980 National Energy Program (NEP) of the Trudeau government outraged both the Canadian oil and gas industry and the U.S. Government with a "Canadianization" program. This was designed to assure that at least 50 percent of Canada's energy resources, now about two-thirds foreign-owned, would be Canadian-owned by 1990. In the wake of the flack over the NEP, the Trudeau government repeatedly promised there would be no similar legislation for the nonfuel mining industry -- which is about two-thirds owned by Canadians.

Minimal written analysis has appeared in the United States on Mineral Policy: A Discussion Paper. But since the paper's appearance in early 1982, reactions among the Canadian mining community have ranged from disappointment to outrage. So noted David Yudelman of the Centre for Resource Studies in Kingston, Canada:

> The initial bitterly critical reaction to the discussion paper was to some extent conditioned by the high expectations generated by the federal government's outline of development policy. Economic Development for Canada in the 1980's, published in November 1981. Put together by an ad hoc committee of five high-powered Cabinet Ministers, Economic Development came out strongly for a resource-based policy which would clearly

> involve direct encouragement of the mining industry, among others. It promised "new initiatives in support of five key resource-based sectors" and a "major report on the mining sector" for late 1981 (as a basis for consultation with the industry and provincial governments".... In fact the discussion paper did not emerge until March 8, 1982, though it was dated December 1981. Prepublication consultation with the mining industry and provincial governments had been perfunctory. The paper contained none of the major new initiatives promised....
>
> Virtually every comment by the industry on the discussion paper takes as its starting point the issue of government intervention. Although the paper explicitly claims to be "basically noninterventionist or laisses-faire".... what it actually offers is no new (their emphasis) intervention.... It tacitly or explicitly accepts the degree of intervention already existing. For this and other reasons, it has been almost universally seen as an interventionist document. These perceptions have been fuelled by the paper's ambivalent attitude to the Foreign Investment Review Agency (FIRA) and the National Energy Porgram (NEP): because of the current high level of Canadian ownership, we are told, "no new measures to strengthen the Foreign Investment Review Agency's operations or policies in the mineral sector appear necessary at this time:....Furthermore, "a mineral sector equivalent to Petro-Canada would not be required in the mineral industry at this point in time"....

For the industry whose most distinctive characteristic is the necessity for long-term planning and a stable policy environment, the references to "at this time" and "at this point in time" sound alarm bells. The increased intervention of the last 10 - 15 years has made the producers extremely sensitive to the issue, and justifiably. But it is far from easy to distinguish clearly been "desirable intervention" (which, after all, is much the same thing as "mineral policy") and "undesirable intervention" (or government interference")...

Many of the industry spokesmen were far from happy about the discussion paper's dual emphasis on economic and social goals: "the maximization of returns to labour and capital - without compromising on social objectives...." They argue that economic goals are the prerequisite for the achieving of social goals, and that social goals - however important - will do little to strengthen the industry. Some even allege that the EMR paper concentrates more on social than economic issues. While this is not accurate, it does provide a striking illustration of the missed EMR opportunity to tie federal mineral policy to the resource-centred Economic Development for Canada in the 1980s. The latter is far more

receptive to the primary importance of economic goals than EMR's paper and, by implication, is far more alive to the urgent need for a mineral policy which will ensure the economic viability of the industry.

In this regard, the industry took particular exception to the use by the EMR paper of the concept of "tax expenditures." The term was taken to imply that government alone creates wealth, owns all profits and "spends" that portion of after-tax profits which remains in the pockets of the producers. One commentator argued tartly that governments create no new wealth and therefore have nothing to give. "Tax expenditures" are actually "tax incentives," and the use of the former term sends shivers down the spines of the diehards of the system of private enterprise.

Many in the industry regard investment climate as the major priority of Canadian mineral policy, and feel that the paper's discussion of this area ... is cursory, complacent and misleading. The paper refers to maintaining an attractive investment climate, and maintaining stability in taxation whereas the producers would argue the climate is not attractive, nor is the tax regime stable. [their emphasis] They point to the National Energy Program, the Foreign Investment Review Agency, and the November 1981 Budget. In these areas, the discussion paper notwithstanding, there have been signs of government efforts to repair the damage done to investor confidence in recent years; but there has been no major reversal in principle. The recent purchase of BP interests by PetroCan, in fact, indicates that a nationalist and interventionist policy is still being followed in the energy area even at a time when one would expect a freeze and an attempt to slow the stampede of departing capita.... Though the government is at pains to distinguish energy and mining policy, the producers note that foreign investors are not satisfied by such distinctions and that they are the key to the investment climate overall....

More than anything else, the producers are seeking a clear commitment from government that one of its policy priorities is to ensure the continued strength of mining .... This is an eminently reasonable, even modest request. The fact that the Mining Association of Canada feels it needs to be made should alert the federal government to the widespread demoralization in the industry and the urgent need to do what it can to restore confidence.

> The discussion paper deals with competitive position with more comprehensively than its brief treatment of investment climate but, to the consternation of many in the industry, does not assign it a place in the six areas of priority attention identified by the paper (junior mining, mineral machinery, science and technology, employment and the quality of working life, international marketing, and investment climate).

Concern about Mineral Policy: A Discussion Paper has been expressed by such Canadian organizations as the Prospectors and Developers Association, Falconbridge Limited, and the Vancouver Board of Trade. Their critiques, like that of Mr. Yudleman, are cited in the bibliography. The bibliography also includes analyses of Canadian nonfuel minerals policy directions contained in issues of the Alert Letter on the Availability of Raw Materials (ALARM), which I wrote, relying mostly on Canadian sources. While many people I talk to have specific concerns about what the Trudeau government is doing, or apparently plans to do, concerning the area of nonfuel minerals -- of even greater interest is the deep concern expressed by so many Canadians about the overall orientation of the Trudeau government away from free enterprise and toward socialism.

In a January 25, 1983, letter to his Yukon constituents, Opposition House Leader Erik Nielsen, M.P., noted that the Liberal Government of Trudeau threatens the basic freedoms that Canadians enjoy. Nielsen commended ("expresses my views entirely") an accompanying speech being transmitted to the constituents, dated December 14, 1982, by fellow Progressive Conservative, Ron Huntington, M.P. for Capilano and Chairman of the Progressive Conservative Caucus. Huntington noted:

> Has it occurred to you that the capitalist system is being buried under the advancing forces of world socialism; that world leaders of these socialist forces are in control of the Canadian government; that the hangman's knot for Uncle Sam's neck is being made in Canada and that Canada is being used as a laboratory for the new international economic order and for world federalism?

Mr. Huntington stated that the Trudeau government is attempting to replace the free enterprise economy with a new economic order which is rooted in the United Nations. "It is not accidental that neither the United Nations nor the Canadian Bill of rights include the right to property ... the United Nations has become a vehicle for world socialism." The federal government's priorities, noted Huntington, are to control culture and communications, to control the food chain, and to control energy.

The intervention-oriented measures suggested in Mineral Policy: A Discussion Paper certainly warrant concern on both sides of the Canada-U.S. border. Some observers say the paper suggests that Ottawa plans to intrude itself into the international marketing aspects of Canada's semi-fabricated and manufactured mineral products industry. Some believe inherent in the directions expressed in the paper is the possible creation of some sort of an international marketing agency for nonfuel minerals and mineral products which could place restrictions on investment (domestic and foreign) and on who buys which Canadian mineral commodities at what prices. Large federal intrusions into the Canadian mining machinery and equipment industry, and into research

and development areas, are also feared. But beyond such issues, it seems that heavy attention must be paid to the "big picture" of what is happening in Canada.

The uproar in Canada and in Washington over the National Energy Program, and the more recent uproar in Canada over the Erola nonfuel minerals policy discussion paper, have perhaps put Ottawa on the defensive in the nonfuel minerals area. For example, Ms. Erola's tone was very conciliatory when she spoke at the American Mining Congress gathering in Las Vegas in October 1982. She said Canada heartily welcomes U.S. investment, in both energy and in nonfuel minerals. But she did not mention her nonfuel minerals policy discussion paper. The recession-related plummet in Prime Minister Trudeau's popularity rating no doubt has also helped restrain some of the Liberals' rhetoric and actions.

Nonetheless, there is no reason to believe that Ottawa will discontinue its efforts to undermine free enterprise in Canadian mining, and in Canadian society in general. One major means of doing so no doubt will be the new Canadian Development Investment Corporation (CDIC). Using the CDIC, with its controlling interest in the Canada Development Corporation (CDC), the federal government is moving to "thrust itself massively into the private sector of the economy -- without Parliament's approval" (to use the words in a February 15, 1983, editorial in Toronto's Globe and Mail).

In concluding this paper on "Canadian Nonfuel Mineral Policies and the Global resource war," we acknowledge we have perhaps raised more new questions than addressed old ones. But whether we are Canadians, or Americans, let us begin to consistently, and persistently, look at strategic resources availability not just in a narrow sense but in the broadest geopolitical sense. We can argue over a great many nonfuel minerals availability issues, whether involving the United States, Canada, or both nations. But let us focus our broadest attention on the types of economies and societies that are operating in each nation. It is desirable that Canada and the United States stay on the same free enterprise-oriented path. But if one or the other nation moves sharply in practice to embrace the "new international economic order" and all that that implies, then it seems new manifestations of the "global resource war" will begin.

Let us not forget the hostile aims of the Soviet Union toward our democratic and free enterprise way of life. The Soviets would be fools to not take advantage of the import dependency of both the United States and Canada on certain key strategic minerals.

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11

U.S. Congressional and Administrative Policies on U.S.-Canada Metal Trade: A Historical Annotation

by

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Introduction

During the past forty years, the United States and Canada have developed a mutual interdependence in the trade of various metals. Faced with declining reserves and reduced mine production, the U.S. depends on Canadian metal imports as a reliable source of materials in short domestic supply (e.g., zinc and nickel). Canadian firms, on the other hand, have benefitted from selling in the large, profitable U.S. markets and wish to continue the relationship in the future. Consequently, any government regulation that alters the terms of trade between the two countries will be of considerable interest for both nations.

In this paper we describe actions proposed by the U.S. government during the past ten years which could have affected the imports of Canadian metals. Specific metals surveyed include, among others, aluminum, zinc, lead and copper. We will describe when the proposed action was initiated, what conditions prompted such a proposal, and whether it was approved.

There exist various methods by which the U.S. could either impede or enhance the flow of imports from Canada. It was found that the primary options included: (1) the imposition of import quotas, (2) tariff legislation, (3) proposed changes in the inventory of various metals in the U.S. stockpile and (4) dumping investigations.

Our research indicates that quotas were considered but never adopted. (A proposed import quota on copper was considered but was not approved by the Carter administration.)

Tariff legislation generally involved the temporary suspension or reduction in the duty of a specific imported metal. Recent tariff legislation has affected the duty on unwrought zinc and lead.

Though most of the metals in the U.S. stockpile are at inventory levels significantly below the desired levels, there has been no serious attempt to purchase additional supplies. The proposed sale of the silver stockpile--whose inventory has been deemed in excess of requirements--has proven to be most controversial.

The U.S. International Trade Commission has instigated dumping hearings on several Canadian imports. These imports included aluminum, lead, copper, zinc and silicon. Action was taken (albeit reluctantly) only in the case of lead.

Chapter 2 will provide a brief discussion of the history of the U.S. metal trade and describe the general issues which the two countries face. A description of the management of the U.S. stockpile will comprise chapter 3. Chapter 4 will describe actions taken with respect to specific metals.

The Development of U.S.-Canadian Metal Trade; A Brief History

After the end of World War Two, U.S. imports from Canada experienced significant growth. The reasons for this growth are quite simple--each country had something the other wanted. The U.S. viewed Canadian imports as a dependable source of inputs that were in short domestic supply. The Canadians, troubled by an increasing trade deficit with the U.S., saw increased exports to the U.S. as a promising source of American dollars.

This growth in imports, however, was not without problems. American producers were concerned about the loss in market share to foreign imports.

The Canadians were concerned over the high American tariffs--as early as 1945, Canadian officials were lobbying for lower U.S. tariffs--and increased American investment in Canadian production. American investment in Canadian mining and smelting operations increased from $215 million in 1946 to $397 million in 1951.

American producer concerns are evidenced by the number of dumping investigations on Canadian imports. Such proceedings were instigated in response to aluminum, lead, copper and zinc imports. In spite of these problems, Canada has emerged to be one of the largest U.S. trading partners in non-energy related products.

The destruction of European production during the last World War and its slow recovery resulted in a signifcant loss of markets for Canadian exporters. However, the U.S. has proved to be a willing trade partner. The growth in Canadian imports can be attributed to numerous factors.

First, the U.S. and Canada share a common border resulting in reduced transportation cost. Raw materials primarily flowed from Canada to the U.S.; and finished goods and product components primarily flowed from the U.S. to Canada.

Second, the amount of U.S.-Canadian trade was facilitated by the degree of U.S. ownership in certain sectors of Canadian natural resources. Consequently, there has been a history of Canadian feelings that the U.S. has exploited the natural resources of Canada.

Finally, the increase in exports to the U.S. was a possible avenue to aid in the diversification of the Canadian economy. It was hoped that the reliance of Canada on its comparative advantages--natural resources-- would result in improved access to the manufactured goods and highly processed resources market.

In the late forties, the primary commodity in U.S.-Canadian trade became base metal. The exports of Canadian metals increased steadily during the postwar period. In

1946, nonferrous metal exports amounted to $350 million. In 1949, nonferrous metal exports equaled $403 million--an increase of 15 percent. As the following table shows, the value of Canadian mineral production also increased during the 1946-1949 period.

Growth in Canadian Metallic Minerals Production

1946-1949

Metal	Total Production in 1946 (in millions)	Total Production in 1949 (in millions)	Percent Increase
Copper	$46.6	$104.7	124%
Lead	$23.8	$ 50.4	111%
Nickel	$54.3	$ 99.1	83%
Zinc	$36.7	$ 76.3	108%

The growth in Canadian production was coincidental to increased U.S. dependence on imports. For the first time, the U.S. became a substantial importer of zinc, lead and copper. Canadian metal exports sustained tremendous growth between 1946 and 1953. Lead exports rose by 50 percent. Nickel shipments increased 30 percent while iron ore exports grew 321 percent.

During this period, the U.S. replaced Great Britain as the primary importer of Canadian metal. During 1936-1939, 9.1 percent of all of Canada's iron exports went to the U.S., while 23.7 percent was shipped to Great Britain. However, during 1951-1954, England received only 7.2 percent of all Canadian exports while the U.S. received 49.2 percent. A similar change in the composition of nonferrous metal exports was observed. During 1936-1939, England received 49.8 percent of such exports but in 1951-1954 time period the percentage fell to 19.2 percent. However, the U.S. received 23.4 percent of the exports in 1936-1939 compared to 53.2 percent in 1951-1954.

The growth in American imports of Canadian metal led to increased investment in Canadian mining and smelting concerns. Between 1945 and 1955, foreign investment in Canadian metal industries totalled $1.4 billion with most of the money being of American origin. In 1939, 42 percent of Canadian mining interest were foreign owned. This percentage increased to 57 percent in 1953.

The U.S. Perspective

What are the issues the two countries currently face? The U.S. has an incentive to facilitate the flow of natural resources from Canada to the U.S. However, the increased flow of materials from Canada may increase U.S. dependence on imports and retard U.S. production. Thus the basic

policy of the U.S. is one of facilitating the flow of needed resources without harming domestic production.

As was noted earlier, in this paper our objective was to review recent U.S. administrative and legislative actions taken to implement this implied policy. While the administrative actions are by their nature more difficult to summarize, we have in the following two tables summarized U.S. legislative actions dealing with (1) tariffs and foreign investment and (2) the strategic stockpile. In the following chapters, these actions will be discussed in detail.

Legislative Actions Dealing with Tariffs and Foreign Investment

Bills	Date	Contents
HR3511	3/24/75	Repeal of the tariffs on metals reimported to the U.S. after intermediate processing abroad. Department of Treasury and Commerce opposed.
HR7716	8/16/75	Temporary suspension of the duty on certain forms of zinc until June 30, 1978. Senate committee recommended its passage. It became law August 9, 1975.
HR9911	9/18/78	Extend the expiration date of HR7716 to June 30, 1981. Senate passed, but it failed to become law.
HR1660	3/5/79	Reintroduce the extension of expiration date of HR7716 to June 30, 1981.
HR3122	7/24/79	Same as HR1660.
	9/11/79	Senate Committee recommended the passage of HR3122.
S1429	3/13/80	Responding to the Canadian
S1436		FIRA, these bills attempt to extend the margin requirements for foreign Borrowers and to impose a 9 month moratorium on the purchase of more than 5% of the voting stock in American energy resource corporations by Canadian interests.

Bills	Date	Contents
HR7791 HR7750	3/13/80	Extend reciprocity from trade to investment.
HR6089	3/17/80	Prohibit the conversion of the tariff on unwrought lead to ad valorem until January 1, 1982. The House committee approved an amended bill that reduces the ad valorem rate below 3.5 percent.
HR5047	9/26/80	Temporary reduction in the tariff on unwrought lead.
PL96-467	10/17/80	HR3122 became law, extending the suspension of the duty on zinc until July 1, 1984.
PL96-609	12/28/80	Temporary reduction of tariff on unwrought lead to 3 percent ad valorem (but not less than 1.0625 cents per pound) until June 30, 1983.
HR4033	7/9/81	Restrict Canadian investment in American energy resource corporations.
HR4145	7/9/81	Extend margin requirements for foreign investors.
HR4186	7/9/81	Restrict foreign investments in U.S. corporations holding federal leases.
S1902	7/21/82	Extend for two years the President's authority to negotiate tariff reductions.
S2031	7/22/82	Temporary suspension of the tariff on copper scale.

Legislative Actions on Strategic Stockpile

Bills	Date	Contents
HR1967	6/17/83	Extension of the expiration date of PL96-0609 to June 30, 1988.
HR15081	9/1/76	Sale of excess stockpile materials, including antimony and silver. The bill was defeated.

S3852	9/29/76	Sale of antimony, but not silver, from the strategic stockpile.
S2635	6/7/781	Sale and acquisition of stockpile metals: purchase of copper and sale of antimony, aluminum oxide, and silver.
S1397	7/10/79	Sale of silver from stockpile
HR3385	7/25/79	Sale of only 15 million ounces of silver from the stockpile--approved in the subcommittee, defeated in the committee.
S1397	10/3/97	Senate version of HR3385.
Hearings	12/4/79	On a compromise legislation on sale of stockpile materials--tin, diamond and silver.
HR595	12/12/79	Strategic and Critical Materials Transaction Authorization Act--passed the House after deleting the sale of silver. Passed the Senate and signed into law, 12/29/79.
H44656	3/13/80	Purchase of silver for the stockpile.
HR2784	6/2/81	Authorize sale of silver.
HR2603	6/4/81	Purchase of silver, platinum and nickel for stockpile.
S906	6/17/81	Authorize the purchase and sale of stockpile materials.
PL97-035	8/13/81	Sale of stockpile materials--silver, and antimony.
PL97-114	12/19/81	Prohibit sale of silver authorized by PL97-35.
S1982	6/9/82	Consolidate management of the stockpile.

S2429	6/10/82	Purchase of copper for stockpile.
S269	4/15/83	Reissue silver dollars utilizing stockpile silver as a means of disposing silver from the stockpile.

2

General Issues:

Tariffs and Canadian Investment or Participation in U.S. Projects

Overview

During periods of recession and declining American productivity, Canadian products have come under closer scrutiny and have been subjected to antidumping investigations. Several Congressmen have pointed to the high degree of Canadian government subsidization in Canada's metal industries. They have publicly asked if it is fair to let foreign, heavily subsidized industries compete with U.S. domestic firms.

The management of the stockpile has also come under Congressional review. Some have asked that in this era of "fiscal responsibility" whether stockpile sales have become merely a source of revenue. The contention is that in its zeal to earn revenue, U.S. policy makers have sold various stockpile metals without regard to the effects in the market place. Others argue that the U.S. relies too heavily on imports from Canada in case of an emergency.

Canadian officials have become increasingly concerned about American investment in Canada's industries. In the seventies, the Canadian government took steps to control such investment. The Foreign Investment Review Agency (FIRA) was formed to monitor investment in Canadian firms. The FIRA ensured that the terms of the investment were sufficiently beneficial for Canada.

The relationship of American firms with the FIRA has prompted several calls for Congressional action. In 1980, two Senate bills were introduced to limit Canadian investment in the U.S. Proponents argued that FIRA actions had severely limited U.S. investment in Canada. In 1979, the FIRA refused to let 30 American firms invest in Canada. The supporters of the bills argued that similar investment restrictions should apply to Canadian firms. However, none of the proposed bills were approved.

Similar proposals were introduced in the House of Representatives. Like their Senate counterparts, the bills called for the extension of reciprocity in trade to foreign investment. Again, passage of the bills did not occur.

In 1981 the House of Representatives introduced at least four bills as a possible legal retaliation against the FIRA. Critics of the Canadian agency maintained that its policies caused the devaluation of American holdings in

Canada and stimulated unfair take over attempts. Congress ordered the U.S. Department of Interior to determine whether Canada was reciprocal nation under the Mineral Lands Leasing Act of 1920. Congressional consternation with the delay of the Interior Department in making such a determination led to contempt for Congress hearings against Secretary James Watt. Nonetheless, on February 3, 1982, the Interior Department ruled that Canada was indeed a reciprocal nation under the Mineral Leasing Act. Research indicates that none of the proposed restrictions on Canadian investment were approved.

Canada has expressed dissatisfaction over the U.S. tariff structure. As mentioned earlier, raw materials flow primarily from Canada to the U.S. Some Canadians feel that U.S. tariffs favor the passage of raw materials but retard trade in finished or semi-finished products. Thus the low tariffs on unprocessed raw materials and the high tariffs on finished or partially finished goods have essentially protected production in the U.S. and discourage it in Canada. In 1975, a bill was proposed to eliminate the tariff placed on materials produced in the U.S. but manufactured abroad. The bill, research indicates, was not approved.

Canada may have benefited from the recent Tokyo Round negotiations. The multilateral trade agreement took effect the first of the year in 1980. The tariffs proposed by the Tokyo Round usually had two characteristics: (1) specific or compound rates were converted into ad valorem equivalents and (2) the tariffs were to be reduced over an eight year period. The amount of U.S. tariff reduction varied among different sectors of the economy.

Several metals were duty free prior to the Tokyo Round and hence were not affected. These metals include nickel, phosphate rock, bauxite, tin, crude sulfur, iron ore, pig iron, titanium ores and manganese ores. However, there was a reduction in the tariffs on high carbon ferrochrome, cobalt oxide, fluorspar, lead ore, and magnesium metal.

The conversion to an ad valorem rate was intended to prevent the erosion of the tariff's protective content by inflation. It was possible that, given an increase in the demand for a particular metal, the conversion to ad valorem equivalents may result in an actual increase of the effective tariff for the metal. It was ironic that a negotiation to reduce tariffs could have resulted in an increase of the effective tariff. It was predicted that the tariff on lead and zinc would increase because of inflation. Subsequent Congressional action temporarily reduced the tariff on lead. The tariff on unwrought zinc has been suspended since 1975.

The tariff in unwrought aluminum will fall from .8 percent ad valorem to duty free status in 1987. This elimination of the U.S. tariff was requested by Canada. This reduction in tariff will benefit the primary aluminum industry of Canada

which is the world's lowest cost producer and world's largest exporter. As the pre-Tokyo Round tariffs were rather low, the actual aluminum imports to the U.S. should not increase significantly. However, Canadian exporters will see significant savings in not paying duties to the U.S. Treasury.

The U.S. is the world's largest producer and consumer of magnesium. Magnesium production is very energy intensive and with its cheap extensive hydroelectric potential, Canada has been encouraging magnesium production. As a result of the Tokyo Round, the U.S. tariff will fall from 20 percent ad valorem in 1980 to 8 percent ad valorem in 1987. At the same time, Canada has been reluctant to reduce its tariff of 5 percent. Consequently, with its low energy costs, Canada may have an important economic advantage in future magnesium production. The U.S. may lose some of its export markets and have difficulty in expanding its own market. (It is important to note that Canadian magnesium entering the U.S. for defense purposes enters duty free).

A Senate report on the impact of the Tokyo agreements on the U.S. industry found that the proposed duty revisions would:

(1) not result in an increse of copper imports or substantially injure the domestic U.S. copper industry.

(2) result in a modes increase in imports of lead, zinc and aluminum with little or no impact on the domestic lead, zinc or aluminum industry.

(3) cause a significant increase in imports of unwrought magnesium and magnesium alloys with a substantial adverse impact on the U.S. magnesium industry.

Thus the bilateral relationship between the U.S. and Canada in north-south raw material flows is best described as one of trade-offs. In terms of tariff legislation, the U.S. must measure the trade off of finding a new source of a critically needed metal and protecting that metal's failing U.S. production. The management of the stockpile requires a measure of the trade off between an adequate defense requirement and stable markets or a fast source of new revenue. Dumping investigations must distinguish between the benefits accrued to the person purchasing the low cost import and the harm in lost sales to the domestic producer. Finally, Canada must balance its dependence on U.S. investment and American markets with its desire to control its own economic production.

U.S. Administrative and Legislative Actions

July 26, 1973.

The Treasury announced that it stopped appraising primary lead from Canada while it determined whether the product was sold in the U.S. at prices less than its fair value. If the Treasury ruled that Canadian lead was being sold at less than fair value and the U.S. Tariff Commission determined that the domestic lead industry was being harmed, then the Treasury could impose antidumping duties. These special duties would be retroactive to the date the Treasury stopped appraising lead for tariff purposes.

October 10, 1973

The U.S. Treasury department ruled that Canadian lead was being sold in the U.S. at less than fair value. The case was then referred to the U.S. Tariff Commission who would determine if the domestic industry was injured by the imported lead. The only two lead producers in Canada at that time were Noranda Mines Ltd. in Toronto and Cominco Ltd. in Vancouver. The president of Noranda said his company wasn't selling any lead to the U.S. at present because of the Treasury case. However, even under normal circumstances, the official claimed Noranda sales and production of the metal wasn't substantial. During the last year, the U.S. imported $18 million of lead from Canada.

January 10, 1974

The U.S. Tariff Commission ruled that domestic lead producers either had been or were likely to be injured by less than fair value imports or Canadian lead. The ruling cleared the way for the assessment of antidumping duties against the imports.

The import complaints were originally filed with the Treasury by Bunker Hill Co. Lead imports from Canada during 1972 totaled about $18 million. Treasury officials said it would take some time, possibly months, to determine the amount of duties to be assessed.

March 29, 1974

In an unprecedented step, Treasury Secretary George Shultz declined to impose dumping duties on Canadian lead and asked the Tariff Commission to review and reverse its findings that such imports were harmful to the U.S. industry. Mr. Schultz's action was taken both as Treasury Secretary and as Chairman of the Cost of Living Council.

Schultz said that U.S. industry was meeting foreign competition and it was gaining an ever increasing share of the domestic lead market. He argued that imposition of the duties would result in higher domestic prices for the metal. The Secretary said that the treasury and the Tariff Commission should carry out their responsibilities under the Antidumping Act in a manner "consistent" with the

government's anti inflation program. He suggested that the injury determination was no longer valid as there had been changes in domestic and world supplies and prices for lead.

April 4, 1974

The Tariff Commission turned down Treasury Secretary George Schultz's request to reverse their ruling on Canadian lead. In an unanimous vote, the Commission said the Secretary failed to raise any new substantive issues justifying a reversal.

April 17, 1974

The Treasury Department ordered penalty duties on imports of primary lead from Canada. Treasury Secvretary George Schultz expressed regret over the Tariff Commission's refusal to reverse their ruling. He said the ruling would "provoke an increase in U.S. lead prices while doing nothing to alleviate the current shortage" of the metal.

Although Canadian lead producers had urged Mr. Schultz to issue final antidumping orders and then immediately suspend them, the Treasury secretary declined. He said he had no other course but to direct the Custom service to begin collecting penalty duties on lead imports sold in the U.S. at unfairly low prices, generally below the Canadian home market price for the metal.

March 24, 1975

The Subcommittee on Trade of Ways and Means Committee of the U.S. House of Representatives began hearings on proposals to amend or repeal the provisions for special duty treatment on materials produced in the U.S. and subsequently assembled or fabricated abroad.

These tariffs on products made from American material but assembled abroad were originally enacted to encourage domestic production and benefit American workers. However, there had been, a growing concern that these special tariff provisions had the opposite effect -- i.e., encouraging foreign production at the expense of employment in the U.S. The subcommittee noted that imports of such items had increased five fold since 1966.

Included as proposed bills was HR 3511. This resolution called for the repeal of the tariffs on metal exported for intermediate processing and returned to the U.S. for final processing. HR 3511 also proposed the removal of duties on products that were assembled abroad from domestically produced products.

The Commerce Department argued that the existing tariffs were "essential to allow U.S. firms to maintain their competitiveness vis-a-vis foreign products selling in both the U.S. and foreign markets". According to the Department of Commerce, "this competitiveness is essential for

maintaining American jobs and for providing lower relative prices for U.S. consumers on the products imported under these provisions".

Feeling that repeal of the tariffs was not in the best interest of the U.S., the Treasury Department also advised against any change in the statutes. "There is doubtful validity," they submitted "to the assumption that repealing these provisions would result in a return of production of the finished product to the United States". The Treasury Department felt that a more likely result would be that the entire manufacturing and assembly process would be driven abroad with U.S. components being replaced with similar articles obtained from other industrial suppliers outside of the United States. Another possible result, the Treasury Department offered, would be a decline in domestic (i.e., U.S.) demand for the product, as a result of price increases. According to Treasury, "the net result would probably be a loss in U.S. jobs and production as exports of components fall off, as well as an increase in the price of the products to the American consumer".

May 9, 1975

At the request of Senator Ted Stevens (R, Alaska), the United States Geological Survey published a report entitled "A Comparative Study of Canadian - United States Resource Programs". The objective of the study was to define the similarities and differences between resource programs in Canada and the United States. The report assessed specifically the manner in which Canadian resource programs stimulate exploration and development in the mineral industry.

June 16, 1975

The House of Representatives Committee on Ways and Means gave a favorable report on HR 7716--a proposal to temporarily suspend the duties on zinc ore and concentrate, zinc dross, zinc waste and scrap and zinc content in zinc bearing materials.

Due to the closure of domestic plants, production of zinc slab has fallen from 1.1 million tons in 1969 to 546,000 tons in 1967. Also, there had been a major reversal in the composition of imports. In 1969, 65 percent of zinc imports consisted of zinc ore and concentrates while 35 percent was zinc metal. However in 1974, only 31 percent of zinc imports consisted of ore and concentrate, the remaining 69 percent being zinc metal.

The domestic zinc industry hoped the reduction in the tariff would help in competing for limited supplies of zinc ore. Other major zinc metal producing countries imposed no tariff on zinc ore and concentrates. In effect, the tariff caused the smelting segment of the U.S. zinc industry to pay a larger price for raw materials. The industry believed that equalization of tariff treatment would encourage present and future development of domestic production capacity and help

revert to the previous composition of imports between ore and metal.

July 14, 1975

The Senate Committee on Finance recommended passage of HR 7716 which would suspend the duty on certain forms of zinc until June 30, 1978. The U.S. production of slab zinc fell from 1.1 million tons in 1969 to 546,000 tons in 1974. The decline in capacity was due to the closure of several domestic firms because of high production costs, plant and technological obsolescence and environmental control regulations. By the end of 1974, U.S. slab zinc production capacity was 60 percent of that in 1968.

Imports of zinc ore and metal amounted to 45-50 percent of domestic consumption since 1967. However, there had been a change in the mix of imports. In 1969, the U.S. imported 927,000 tons of zinc--65 percent of which was in ore and concentrate form while 35 percent was zinc metal. By 1974, when imports totaled 780,000 tons, ores and concentrates constituted 31 percent of imports and 69 percent was slab zinc. Between 1967 and 1871, the U.S. imported 510,000 short tons of ore and 209,000 short tons of zinc metal annually. However in 1974, the U.S. imported only 240,000 tons of zinc ore and 540,000 tons of zinc metal. Canada was the major supplier of imported zinc ore and concentrates followed by Mexico and Peru.

Other major zinc metal producing countries imported zinc ores and concentrates free of duty. The domestic zinc industry argued that the U.S. tariff places domestic smelters at a disadvantage in competing with foreign zinc metal. The duty on ores imposed, in effect, a penalty on the smelting segment of the industry by increasing cost of raw materials.

August 9, 1975

HR 7716 which provided for the suspension of the duty on zinc ore and concentrate, zinc dross, zinc bearing materials and zinc waste and scrap until June 30, 1978 became law.

June 20, 1978

The United States International Trade Commission found, by a 5 to 1 vote, that the domestic industry was not being injured or threatened with serious injury by the imports of unalloyed, unwrought zinc. The complaint was filed by the

Lead-Zinc Producers Committee which claimed that zinc imports are injuring the domestic industry. Imports of zinc during 1977 totaled 550,000 short tons valued at $359 million--43 percent of which came from Canada. The zinc producers asked the Commission to increase the tariff from .7 cents a pound to 7 cents a pound and impose a quota of 350,000 tons a year.

The report noted that, in 1977, there were six domestic zinc producers. U.S. production of slab zinc declined from 1969 to 1975, then increased slightly in 1976. Production in 1977 declined to a 10 year low of 450,000 short tons. In 1977, the price of imported zinc averaged about 4 percent less than U.S. producer prices. U.S. exports of zinc declined from 19,000 short tons in 1974 to less than 500 short tons in 1977. During 1968-1975 domestic slab zinc production capacity declined from 1.3 million short tons to 723,000 short tons. The decline in capacity could be attributed to the closing of eight producers. These closings were often caused by a combination of age of facilities, costs of complying with pollution control regulations and the inability to obtain adequate supplies of raw materials.

September 18, 1978

The House of Representatives passed HR 9911 which proposed to continue until June 30, 1981 suspension of levying duties on some forms of imported zinc. Although the previous suspension expired on June 30, 1978, it was believed that the reinstatement of the suspension of duties would have a net beneficial effect on the domestic interest involved. The U.S. slab zinc producers were partially dependent on imports to meet their raw material needs and the cost savings which resulted from the suspension of duties directly contributed to the ability of the U.S. slab zinc producers to compete with foreign producers.

September 26, 1978

The Senate Committee of Finance recommended passage of HR 9911 which included the proposal to reinstate the temporary suspension of duties on some forms of zinc that expired June 30, 1978. The bill proposed to temporarily extend (from June 30, 1978 to June 31, 1981) the suspensions of duties on imported zinc ores and concentrates used in the production of zinc metal. Duty free entry of these products was permitted from August 9, 1975 to June 30, 1978. The report stated that domestic zinc mines could not supply enough ore to satisfy the demand for zinc metal. The bill's intention was to reduce the cost of an important source of zinc for domestic zinc producers. This proposed suspension would apply retroactively on request, to entries made after June 30, 1978 and before the enactment of the law.

The Senate passed HR 9911 which included proposals to continue the suspension of duties on some forms of zinc. However because of the amendments, though unrelated to zinc, which the Senate attached to the bill, the proposal was reintroduced on October 10, 1978. However, no action was taken before the Congress adjourned and the bill failed to become law.

March 5, 1979

The House Ways and Means Committee held hearings on several tariff bills, one of which called for the reinstatement of

the expired suspension of duties on certain forms of zinc. HR 1660 would authorize the continued suspension of tariff on certain forms of zinc until June 30, 1981.

An administration witness favored the reinstatement of the suspension. The U.S. producers were dependent on imports to meet their raw material needs and the suspension of duties would result in cost savings which would contribute directly to the ability of the U.S. slab zinc producers to compete with foreign producers. Also, U.S. industry sources reported that U.S. mining capacity for zinc was inadequate to meet domestic demand. The Treasury department supported passage of HR 1660 as the inability of domestic producers to obtain zinc ore at reasonable prices would add significantly to inflationary pressures.

July 24, 1979

The House Ways and Means Committee reported favorably on HR 3122 and recommended its passage. Included in HR 3122 was the proposal to extend the previously expired suspension of duties on zinc ores and concentrates used by domestic zinc manufacturers as necessary raw materials in the production of zinc metal. The duties on these items were originally suspended between August 9, 1975 and June 30, 1978 in recognition of the facts that U.S. mines did not have sufficient capacity to meet demand and that other major zinc producing countries import zinc ores and concentrate duty free. The domestic suppliers sought continuation of the suspended duties until July 1, 1981 in order that they might compete more effectively with foreign zinc producers.

The rationale for the proposal was based on the fact that domestic zinc mines could not supply enough ore to satisfy the domestic demand for zinc metal. The intent of this bill was to reduce the cost of an important source of zinc for domestic manufacturers.

December 11, 1979

The Senate Committee on Finance recommended passage of HR 3122 which included the proposed reinstatement of the suspension of duties on certain forms of zinc. The proposal called for the suspension of duties until June 30, 1981 and could apply retroactively, upon timely request, to articles entered or withdrawn from the warehouse for consumption after June 30, 1978. According to the bill, zinc ore and concentrate, zinc dross, zinc bearing materials and waste and scrap zinc would be subject to the exemption. Zinc imports totalled 135,000 tons in 1977 and 127,000 tons in 1978. Canada supplied approximately 50 percent of imported zinc ore and concentrate.

March 13, 1980

The Senate Committee on Banking, Housing and Urban Affairs held hearings to consider the merits of S1429 and S1436. The purpose of these bills was to extend the margin requirements for foreign borrowers and to impose a 9 month

moratorium on the purchase of more than 5% of the voting stock in American energy resource corporations by Canadian interests.

The bills were proposed in direct response to actions taken by the Canadian Foreign Investment Review Agency (FIRA). The FIRA had refused more than 30 American corporations permission to invest in Canada within the last year. The Committee heard testimony that American companies had been severely restricted in their attempts to acquire or transfer their Canadian mineral and energy assets because the FIRA would not grant the necessary approval. The affected firms claimed to have witnessed a steep decline in the value of their Canadian assets. Furthermore, these firm testified that Canadian firms, with the support of the Canadian government, had sought to acquire their Canadian holdings at bargain prices, by threatening a takeover of U.S. companies.

Proponents of the bill argued that the measures should not be viewed as punitive measure against Canada. Rather, they argued that the proposals were simply a reaction to Canada's punitive behaviour toward the U.S., i.e., the FIRA's refusal to allow American investment.

March 17, 1980

The subcommittee on trade of the House of Representatives Ways and Means Committee held hearings to discuss several tariff proposals among which was HR 6089--a proposal to prohibit until January 1, 1982 the conversion of the tariff on unwrought lead to ad valorem equivalents. The specific lead duty of .0625 cents a pound was converted to ad valorem rates by the Tokyo Round agreements which were instituted January 1, 1980.

An administration witness said that the administration was opposed to the bill. He said the current tariff was reached after intense negotiation by the U.S. in the Multilateral Trade negotiations. Specific and compound tariffs were converted to ad valorem rates to preserve the tariffs' protective nature from inflation. The effect of the duty conversion was to freeze tariff protection on the converted items at 1976 levels and to prevent further erosion of those levels via price changes. A proposed 5.1 percent ad valorem tariff was used as the basis of the Multilateral Trade Negotiations. After the MTN, the tariff was reduced to 4 percent. The present tariff rate of 3.5 percent ad valorem was reached after a bilateral agreement with Mexico. However, during the last two years the price of unwrought lead had risen significantly as general inflation and world demand had increased. Therefore, the 3.5 percent ad valorem tariff resulted in an effective increase in tariff over the specific 1.0625 cent a pound tariff that was in effect before January 1, 1980. The witness added, "The administration is sympathetic to the concerns of the domestic lead consuming industry over having to pay increased duties on imports of unwrought lead as a result of the conversion and rapid increase in lead prices".

In 1979 the U.S. imported 184,000 short tons of lead--mainly from Canada, Peru and Mexico. Imports accounted for approximately 15 percent of total consumption.

A congressman mentioned that he felt the MTN were to reduce net tariffs for lead. "This conversion of a specific rate to an ad valorem rate actually increases it", he noted.

A critic of the proposed bill said its passage would have a severe impact on the domestic lead industry. The 3.5 percent duty was entirely reasonable, he argued, because it was equal to the duty imposed by the Common Market countries and less than the duties that Mexico of Japan impose on imported lead. There would be no gain in an unilateral reduction. Since the Environmental Protection Agency and the Occupational Safety Agency were requiring significant investments of capital by the domestic lead industry, the 3.5 percent protective tariff would be appropriate, the critic argued.

July 22, 1980

The House Ways and Means Committee gave a favorable report on HR 6089. Originally, the bill prohibited until January 1, 1982 the conversion of the rates of duty on unwrought lead to ad valorem equivalents. However, the committee approved an amended bill that would reduce the 3.5 percent but the duty could not be less than 1.0625 cents per pound on the lead content. The bill was proposed to reevaluate the level of the Tokyo Round converted rates of duty on lead. Due to inflation and increased demand the conversion to ad valorem equivalents actually resulted in an increase of the tariff. In 1980, with current lead prices at 50 cents a pound, the 3.5 percent ad valorem tariff rate resulted in a 65 percent effective increase of the 1.0625 cents per pound duty that existed before the Tokyo Round. The amended bill was only a temporary modification that expired on June 30, 1983.

The amended bill supposedly represented a compromise between lead producers and consumers. The 3.5 percent ad valorem tariff on unwrought lead was drafted in bilateral negotiations between the U.S. and Mexico. The agreement was made by Mexico upon its expected accession to GATT. However, Mexico decided not to join GATT and the U.S. has been actively seeking trade concessions from Mexico as reciprocity for the existing tariff reductions on lead. The Administration had been concerned with Mexico's lack of concessions in negotiations to date and was considering increasing the unwrought lead tariff back to 4 percent ad valorem if satisfactory reciprocity from Mexico had not been received in the near future. The U.S. lead producers and lead consumers, instead of prohibiting the use of ad valorem rates as initially proposed, compromised on a reduction to 3 percent ad valorem but not less than 1.0675 cents a pound. The administration, wishing to preserve some leverage in lead negotiations with Mexico, desired a temporary rather than a permanent change.

August 19 and September 9, 1980

The Committee on Interstate and Foreign Commerce of the U.S. House of Representatives conducted hearings on reciprocity in investment. Of major concern to the Committee was the Canadian Foreign Investment Review Agency (FIRA) which had recently rejected approximately 20 percent of U.S. investment proposals concerning Canadian firms.

Some witnesses felt that the actions of the FIRA might have been justified in light of the fact that 50 percent of the manufacturing sector in Canada and 70 percent of the Canadian natural resource industry are foreign-owned. However, other witnesses felt that most of the problems affecting Canadian economy were due to the Canadian government's regulation of industry.

The Committee heard testimony that Canadian investment in the U.S. had tripled over the decade of the 1970s. And, it was noted that, on a per capita basis, there was more Canadian investment in the U.S. than U.S. investment in Canada. One witness offered the view that Canadians invest in the U.S. because the U.S. market is 10 times as large as

the Canadian market and because the investors feel there would be less government regulation in business in the U.S. than in Canada.

Two similar bills - Hr7791 and HR7750 - were proposed. The main purpose of both bills was to extend reciprocity from trade to investment. The bills provided that, for a foreign person or business seeking to acquire 5% or more of the equity of an American corporation registered with the Security Exchange Commission, the foreigner's rights are limited to those which a U.S. national would have in the potential investor's country when trying to purchase securities.

September 26, 1980

The Senate Committee on Finance reported favorably on HR 5047, a miscellaneous tariff bill that included the temporary reduction in the tariff on unwrought lead. The report stressed the reason for the provision was: (i) to provide a stabilization of the rates of duty on unwrought lead to a lower evaluation of the proper ad valorem equivalent of the prior specific duty (1.0625 cents per pound), (ii) to assure domestic lead consumers an adequate supply of lead at prices as reasonable as possible under world price conditions and (iii) to provide the Administration with leverage in international negotiations on tariff rates on lead.

October 17, 1980

HR 3122, a bill relating to the tariff treatment of several articles, became law (PL 96-467). Included in the law is the suspension until July 1, 1984 of the duties on zinc ore and concentrate, zinc dross, zinc bearing materials and zinc

waste and scrap. There was a provision to apply the suspension retroactively to June 30, 1978 upon timely request.

December 28, 1980

Public Law 96-609, which included the temporary tariff reduction on unwrought lead, was approved. The law temporarily reduced the tariff on unwrought lead to 3 percent ad valorem on the value of lead content but not less than 1.0625 cents per pound on the value of lead content. The provision will expire June 30, 1983. The law was made retroactive to January 1, 1980.

February 25, 1981

The Senate Committee on Foreign Relations conducted hearings regarding the increasing dependency of the United States on imported metals. Specific attention was given to the growing reliance of the U.S. on metal imported from developing countries.

The committee was informed of the growing scarcity of U.S. metals. As an example, testimony was presented indicating that the closing of several U.S. zinc processing facilities had reduced domestic capacity by almost 50 per cent. Consequently, imports of zinc metal had increased by 89 percent. Furthermore, analysts reported to the Committee that aluminum demand was forecasted to grow at a rate of seven percent annually through 1985, while U.S. production was forecast to grow at only 1.4 percent annually. Hence, the Committee was warned that imports of aluminum were expected to double by the year 2000.

July 9, 1981

The Committee on Energy and Commerce of the U.S. House of Representatives conducted hearings inquiring into the impact of Canadian investment and energy policies on commerce in the United States. Critics of Canadian policies claimed that these policies had stimulated unfair takeover attempts of U.S. companies and devalued the Canadian assets of U.S. energy companies.

Possible legal retaliation was proposed in several bills: (1) HR 4033 would restrict Canadian investment in American energy resource corporations. (2) HR 4186 would amend the Mineral Lands Leasing Act to restrict foreign investments in U.S. corporations holding Federal leases under that Act.

An alternative possible reaction discussed by the Committee was the invocation of the reciprocity provisions of the Mineral Lands Leasing Act of 1920. The provisions of that Act state that interest in mineral leases on federal lands can be held by foreign citizens only if their nations accord equivalent opportunities to U.S. citizens. It was noted by the Committee that the Trade Policy Committee of the Cabinet

had requested the U.S. Department of Interior to accelerate its determination of the question of whether or not Canada is a reciprocal country within the Act. (If Canada were determined to be nonreciprocal, then Canadian investors would be prohibited from owning stock in corporations holding mineral leases on federal lands).

September 1981

The Committee of Banking, Finance and Urban Affairs of the U.S. House of Representatives released a publication entitled "Congressional Handbook on U.S. Material Dependability/Vulnerability". The publication discussed the reliance of the United States on imported materials, the possibility of foreign cartels affecting the price of imported metals, the adequacy of the current stockpile program, and the role of foreign investment in U.S. mining interests.

As an example, the report mentioned that if no other additions to U.S. zinc reserves were discovered, the U.S. cumulative demand would be expected to exceed U.S. zinc reserves by the year 1993. The report concluded that "in order to meet demand for zinc in the future, it will be necessary for the U.S. to increase imports or to create new reserves."

Because of the growing U.S. dependence on imported metals, the report mentioned the possible threat of foreign producers forming a cartel. One possibility explicitly mentioned was the threat of a nickel cartel.

It was noted in the report that the first major stockpile purchase in 20 years took place in 1979. However, the report also observed that no funds for stockpile transactions were appropriated in the fiscal years 1979 or 1980. ($100 million was appropriated in 1981 and the U.S. government announced intentions to purchase bauxite, columbium, manganese dioxide, titanium cadmium and nickel). The report noted that amendments had been approved by the U.S. House of Representatives that would restrict the sale of silver from the stockpile after September 30, 1982, pending a review and determination of the appropriate silver policy by the President. (More will be said about the U.S. stockpile in the next chapter.)

The report concluded that concerns voiced by the public and private sector about the level of foreign investment in the U.S. may indeed by justified, in view of the rapid increase in the size of the companies targeted for takeover and the concentration of the national origins of the takeover offers. Following is a table extracted from the report that described the role of Canadian firms in the potential takeover of U.S. firms.

Canadian Takeover Offers for U.S. Firms

year	Number of bids	Cost to bidder (millions)	Percent of total offers
1979	3	$ 530	58.1
1980	5	$1796	52.2
1981	3	$6129	68.8

The report observed that "the overwhelming dominance of Canada both in number of tender offers and the apparent value of the targeted assets as measured by the cost to the bidder is beyond question."

February 3, 1982

James Watt, Secretary of the U.S. Department of the Interior, announced the determination that Canada was a reciprocal nation under the terms of the Mineral Lands Leasing Act of 1920. In determining the reciprocity status of Canada, the Secretary found that Canadian laws and regulations do not deny American citizens and corporations the privilege of stock ownership in corporations which have an interest in Canadian mineral resources. Because of this determination, Canadian citizens and corporations would continue to be able to purchase and own stock in U.S. corporations holding mineral leases issued under the Mineral Lands Leasing Act.

July 21 and 22, 1982

A subcommittee of the Senate Committee on Finance held hearings to discuss the merits of several bills proposing various tariff reductions. In terms of the metal imports, particular bills of interest were S. 1902 and S. 2031.

S. 1902 would extend for an additional two years the President's authority to negotiate tariff reductions pursuant to section 124 of the Trade Act of 1974. This law --which gave the President limited authority to negotiate and implement changes in certain tariffs--expired on January 3, 1982.

Senator Steven Symms (R. Idaho) expressed concern over the proposed legislation and its effect on the U.S. domestic zinc and lead industry. "The lead and zinc industry cannot afford to have the threat of tariff cuts hanging over it," he said. Symms maintained that the combined effects of the tariff reductions of the Tokyo Round and the subsequent Congressional action of temporarily reducing the lead metal duty for a three year period had contributed to the decline of the domestic industry.

The Senator noted that while major U.S. zinc producers were being forced to close their facilities, "the Canadians were building a $360 million zinc smelter project in northeast New Brunswick." He claimed that $3.5 million of the money

financing this new construction came from the Canadian government.

Symms said that "over capacity for lead and zinc have developed on a worldwide basis, in part because foreign governments have encouraged, and in some instances, subsidized mining and smelting operations."

Given that the U.S. tariffs on lead and zinc metal are lower than the current duties existing in Japan or the European Common Market, Symms stressed that further reductions in the U.S. duties on these metals would endanger the U.S. domestic producers.

The other bill, S. 2031, would provide for a three year temporary suspension of the tariff on copper scale. Currently, certain materials containing over 10 percent copper that is to be treated at a copper plant are subject to a duty of 62 cents per pound of copper content, plus various other duties depending on lead and zinc content.

April 1983

In an attempt to eliminate hazardous waste, a working paper presented to Congress urged the substitution of zinc for cadmium in electroplating processes. The office of Technology Assessment paper noted that even a trace of cadmium has adverse health effects. Several studies have discovered a significant correlation between occupational exposure to cadmium oxide and fumes and the incidence of cancer.

The report maintains that the substitution of zinc for cadmium in electroplating will significantly reduce cadmium releases. The substitution is also advisable in that it is both economically and technically feasible. In the past, zinc has been less costly than cadmium. However, the substitution of zinc for cadmium has been retarded as current Department of Defense procurement regulations tend to favor the cadmium products.

Currently, the U.S. imports almost half of its cadmium consumption. However, the substitution to zinc will increase the U.S. dependence on imports as the U.S. imports much of its zinc consumption.

June 17, 1983

A House of Representatives subcommittee of the Ways and Means Committee reported on HR 1967 which would provide for a five year extension of the reduction of the duty on unwrought lead.

In essence, HR 1967 would extend the current tariff reduction on unwrought lead--which expires on June 30, 1983--to June 30, 1988. In 1982, 47 percent of all unwrought lead imports came from Canada.

This legislation was introduced as a measure to aid both producers and consumers of unwrought lead. It was hoped that the continued reduction in the tariff would lead to stability of price and supply in the primary lead market.

Before January 1, 1980 the duty on unwrought lead was 1.0675 cents per pound of lead. After the trade negotiations of the Tokyo Round and a bilateral agreement with Mexico, the present rate of 3.5 percent ad valorem on the lead content was adopted. But, due to high lead prices, the conversion to ad valorem equivalents resulted in an effective increase in the tariff on unwrought lead.

In order to provide an adequate supply of this metal. Congress place a temporary floor on the tariff--the 1.0675 cents per pound duty that existed prior to the trade negotiations.

June 24, 1983

The House ways and Means Committee reported favorably on HR 3398. Section 130 of the bill was originally HR 1967--the bill which proposed a five year extension of the reduction in duty applied to unwrought lead.

The bill provided for a continued 3 percent ad valorem duty on unwrought lead; however, the tariff can not fall below 1.0625 cents per pound. The temporary reduction will expire in June, 1988.

-3-

The U.S. Strategic Stockpile

Overview

In a move to prepare for future contingencies, the U.S. began a National Defense Stockpile in 1946. American officials were concerned over the growing reliance on foreign sources for a host of metals. The U.S. was already importing nickel, manganese and chromite. The war had depleted American reserves of copper, lead, and zinc. Feeling that the dependence on foreign metal imports could reduce American military strength, officials felt that a stockpile was necessary to supplement domestic supplies in times of war.

Even as the stockpile legislation was enacted in 1946, Congress debated over the appropriate mix of foreign and domestic suppliers. Congress stressed that any purchase should be made in accordance with the Buy American Act of 1933. This act required the purchase of American goods unless the cost was prohibitive or such a purchase was contrary to the national interest. However, President Truman argued that a "large volume of soundly based international trade" was essential to ensure adequate supplies.

Even though domestic purchases were made when possible, by June 30, 1950 39 of the 64 materials being stockpiled came from foreign producers. However, unfortunately for Canadian producers, inventories of lead, zinc and aluminum came largely from domestic suppliers.

During the 1950s, the U.S. came to regard Canada as a secure supplier of needed metals. During this time period, iron ore was not even stockpiled. The strategic inventory of nickel and copper were eliminated. The stockpile inventory of lead and zinc was considered minor.

In June of 1958, the stockpile levels of lead and zinc were set at an inventory less than one fifth of the levels of preceeding years. Consequently, the U.S. stopped making new purchases. The U.S. began to sell stocks of lead and zinc when market conditions were already depressed.

Past and current management of the stockpile has often been erratic. Though the current levels of several metals are significantly below stated goals, there has been no aggressive purchasing of new supplies. One reason for the lack of new additions can be attributed to rising concerns over the U.S. deficit. Given scarce funds, proposed stockpile purchases are passed over for higher priority items. Another reason for the lack of new additions can be attributed to the perception that the U.S. can rely on the dependable imports from neighboring countries such as Mexico and Canada.

Some critics feel that the stockpile has been used for budgetary considerations. Excess stockpile inventory has been sold off not to finance new acquisition but to generate needed revenue. Other opponents have objected to the proposed inventories of some metals. Certain members of Congress, for instance, feel the zero inventory goal of Congress for stockpiled silver is inappropriate. Current stockpiles are supposedly based on a three year mobilization plan. Other contend that various stockpile sales and purchases are inappropriate in that they disrupt the specific metal markets.

During the past nine years, the proposed sale of the entire inventory of stockpiled silver has been most controversial. Before 1980, several bills proposed such a sale but all were defeated. The Gramm-Latta Act--President Reagan's first budget bill--finally authorized the sale of silver over a three year period. However, in the same year, Congress suspended such sales.

Actions Taken With Respect to the Stockpile

September 1, 1976

The Committee on Armed Services of the U.S. House of Representatives held hearings on HR 15081 that would authorize the sale of excess materials from the National Defense Stockpile. Included in the materials to be sold was 10,000 short tons of antimony and 118 million troy ounces of silver.

Proponents of the measure argued that the sale of these metals, whose inventory was greater than their stockpile goals, would provide funds for the purchase of materials in short supply in the stockpile. The silver sale was advisable, witnesses testified, not only because there was an adequate supply in the stockpile in excess of goals but also because, in case of an emergency, Canada and Mexico were both reliable sources of imported silver.

September 13, 1976

In the U.S. House of Representatives, the Committee on Armed Services reported favorably on HR 15081, authorizing the disposal of surplus stockpile material including silver and antimony. The committee report noted that the stockpile goals were based on a three-year mobilization or emergency period. In the case of antimony, the Department of Defense felt the requirements for three years could be met from domestic secondary recovery of the metal without resorting to primary production or imports.

The three year requirements for silver, the report added, could be met entirely from primary and secondary production in the U.S. Hence the stockpile goal for silver should be zero and the entire stockpile silver inventory of 139.5 million troy ounces was in excess to the needs for national security. (Only 118.5 million ounces were authorized to be

sold however, leaving an additional hedge of 21.5 million ounces.)

HR 15081 did not pass in the House of Representatives. Apparently, some Representatives did not accept the zero stockpile goal for silver on which the proposed sale was based.

September 19, 1976

The Senate Committee on Armed Services reported to the Senate on S 3852 -- a bill to authorize the sale of certain materials from the national stockpile.

Included in the bill was a proposed sale of 118 million troy ounces of silver. The committee noted that this sale would eliminate all but 21.5 million ounces of silver that existed in the stockpile. Because of the declining sources of silver, the committee felt that the administration had not fully evaluated the national defense requirement for silver. Therefore, the committee took the position that no silver should be released from the stockpile.

The committee did however recommend the sale of 10,000 short tons of antimony. In the past, antimony was primarily used in batteries and as a fire retardant. The metal's use in batteries had declined over recent years as technology developed the new, maintenance-free batteries which use little, if any, antimony. In view of the decreased requirement of antimony, the committee felt the release of 10,000 short tons of the metal was appropriate.

June 7, 1978

In a favorable report to the Senate on S 2635, the Senate Committee on the Armed Services recommended passage of the bill that would authorize the sale and acquisition of several stockpile metals.

The bill proposed the purchase of $579 million of stockpile materials. Included was a proposed purchase of 225,000 tons of copper.

The proposed legislation authorized the disposal of 1,500 short tons of antimony, 20,000 short tons of aluminum oxide and 15 million troy ounces of silver. The three metals scheduled for disposal had stockpile inventories in excess of administration stockpile goals.

July 10, 1979

A subcommittee of the Senate Committee on the Armed Services held hearings on S 1397--an administration proposal to sell 15 million ounces of silver from the defence stockpile. An administration witness testified that "our analysis indicates that sales at rates specified can be absorbed by the markets without disruption of these markets and without loss to the government." The administration officials

pointed out that the silver inventory is currently in excess of its zero goal and funds from the sale can be used to finance acquisition of critically needed materials that are in short supply in the stockpile. The silver stockpile of 139.5 million ounces represents less than 1/3 of a year's industrial consumption of silver in the free world. Industry analysts remarked that the 15 million ounces of silver to be sold could be readily absorbed on the market and the government could realize a substantial sum.

One critic of the silver sale questioned the reliance of government projections on imported silver. The government, he said, laid "great stress on the large production of silver in Mexico and Canada, on the theory that these supplies would be available to the country in the event of an emergency. I point out that Mexico and Canada are producers of oil. How true has this been with regard to Canadian and Mexican oil in the present crisis?" The witnesses stressed that Canada and Mexico would make their own decision in regard to the disposal of their silver output and that U.S. policy cannot and should not automatically assume that silver from these countries will flow to the U.S. in a time of crisis.

Some witnesses questioned the proposed bill in the House of Representatives that would authorize the sale of the entire 139.5 million ounce stockpile. "Once sold, it (the silver stockpile) would no longer exert whatever restraining influence it has had on a market that has advanced very sharply in price over the past 12 years." There was a need for silver in the stockpile, critics argued and the sale of the entire inventory may be regretted. Some argued that the U.S. is running out of silver and the incentive to produce it. Given the questionable U.S. silver supply, critics maintained that such a sale would not be advisable.

July 25, 1979

Hearings before the House Committee of Armed Services debated the merits of two proposed laws--HR 1325 and HR 3385--that would authorize the sale of silver from the national stockpile. While HR 1325 authorized the disposal of the entire stockpile inventory of 139.5 million troy ounces of silver, HR 3385 authorized the disposal of only 15 million ounces. It was noted that it was the duty of Congress to authorize the disposal of those "materials determined by Congress to be in excess of defense requirements and acquire those materials needed and in short supply."

Administration witnesses reported that there was no requirement for silver in the stockpile and the 139.5 million troy ounces in the stockpile were in excess of the needs of the nation. The administration felt that 15 million ounces of silver could be sold over a one year period "without much disruption of the market." The other bill, which authorized disposal of 139.5 million ounces, would require the sale to be over a longer period of time--withholding or increasing sales depending on market

conditions. One congressman argued that the silver sale would bring in revenue to acquire needed materials for the stockpile. Also making the silver available would be in the best interest of consumers of products which use silver--photograph, electrical products, silverware and jewelry. Given the price of silver, proponents of the sale said the sale would mean increased revenues to the treasury--a benefit for all taxpayers. Finally, critics of the silver stockpile noted that it cost $355,000 a day in foregone interest to maintain the stockpile.

Critics of the silver sale pointed out a possible future silver shortage. Between 1976 and the year 2000, there would be a predicted shortfall in the supply of silver of almost 6 billion ounces. Silver, they maintained, would be the first metal which the world would run out of at traditional prices. Critics felt the administration underestimated the requirements for silver in case of an emergency and placed an undue reliance on imported silver. "There is nothing to prevent Canada, Peru and Mexico from forming a cartel in the silver business and placing us in exactly the same situation that the OPEC committee now places us with respect to oil," said one opponent of the sale.

The subcommittee approved the proposed sale of 15 million ounces by a 5 to 4 vote. The proposal to sell the entire silver inventory was defeated.

Opponents of the proposed sale pointed out that similar attempts to sell the silver inventory were defeated in both the 94th and 95th Congresses.

September 11, 1979

The entire House of Representatives Committee on Armed Services held hearings on HR 3385--a proposal to sell 15 million ounces of silver. If approved the sale would reduce the stockpile silver inventory to 124.5 million ounces. The congressman noted that the predicted silver requirements during a three year long emergency period was 141 million ounces. Feeling that domestic primary and secondary production could produce this amount and that imported silver came from reliable sources, the administration set the stockpile goal for silver inventory at zero. The committee felt that, given the estimated requirement of 141 million ounces of silver during a three mobilization period, the zero inventory goal was unrealistic and placed too much emphasis on imported silver.

The bill was defeated in committee.

September 26, 1979

The head of the Federal Property Resource Service reported to the Senate Judiciary Committee that there was legislation before Congress to authorize the sale of several stockpile

commodities. He pointed out that silver had a zero goal in the national stockpile and that the entire inventory was in excess. The official recommended the sale of the silver stock pile in order to finance the acquisition of critical minerals in short supply in the stockpile.

October 3, 1979

The Senate Committee on Armed Services rendered a favorable report on S. 1397--an administration backed bill to dispose 15 million troy ounces of silver from the nation's stockpile. Currently, 139.5 million ounces of silver was in inventory while the stockpile goal was zero. The Governmental Accounting Office reported "the 139.5 million troy ounces of silver included in the stockpile are not required because probable wartime supply exceeds projected U.S. requirements." The proposed sale was contingent on the provisions that the government avoid a loss from the sale and avoid undue disruption to the commodity market.

The Committee was satisfied that the proposed sale of 15 million ounces would not damage national interest.

December 4, 1979

The Committee on armed Services of the U.S. House of Representatives reported on The Strategic and Critical Materials Transaction Authorization Act of 1979 -- a compromise legislation drafted by a joint congressional Committee. The proposal called for the disposal of 35,000 long tons of tin and 3 million carats of industrial diamond stones. The Senate had passed a version that included the sale of 15 million ounces of silver, while the House bill contained no authority for the disposal of silver.

After lengthy debate, the House conferees on the joint committee reluctantly agreed to accept the disposal of 5 million troy ounces of silver.

December 12, 1979

The merits of HR 595--the Strategic and Critical Materials Transaction Authorization Act--was debated on the floor of the House of Representatives. Concerned over whether the zero stockpile goal was appropriate and the possibility of a future silver shortage, there was a motion to exclude the proposed 5 million ounce silver sale. The motion passed 272 to 122.

December 12, 1979

The entire Senate heard debate on the Strategic and Critical Materials Transaction Authorization Act. The Senators noted that the House had voted to strike the sale of 5 million ounces of silver. it was argued that the "prudent action is to get the bill to the President so that stockpile acquisition can get under way."

Some questioned the House action in striking the silver sale. "The issue of the sale of excess silver will

undoubtedly recur in furture legislation.." It was agreed that a future sale of silver was necessary to finance the acquisition of critically needed materials. "We do not need silver for the National stockpile," said one Senator. "We will not use silver bullets in the next war."

The Senate approved the compromise bill which was amended by the House of Representatives. The bill, minus the provision of the silver sale, was signed into law December 29, 1979.

February 15, 1980

In hearings before the U.S. Senate Committee on Appropriations, the chairman of the US Bureau of Mines reported on the adequacy of stated U.S. stockpile objectives.

In the course of the hearing, it was determined that the stockpile goal for copper was 1.3 million tons but there was virtually none in the stockpile. However, testimony was received that "we have substantial domestic mine and smelter capacity in this area".

According to the Bureau of Mines, nickel is another metal in deficit. There was virtually none in the stockpile at this date but there was a stockpile goal of almost 200,000 tons. However, according to the Bureau of Mines, Canada is a major supplier of nickel to the U.S. so this is a "factor to consider relative to the zero inventory."

March 13, 1980

The House Committee of Appropriations conducted hearings on HR 4656--a proposal to appropriate $513 million for the acquisition of silver for the stockpile. The administration witness strongly opposed the bill because it was inconsistent with the current stockpile goal. The silver stockpile consisted of an inventory of 139.5 million ounces of silver while the present stockpile goal was zero. Furthermore, the Administration had already taken positions in support of legislation which would authorize disposal rather than purchase of silver for the stockpile. The administration had previously requested a sale of 15 million troy ounces--a sale that they claimed would not disrupt the silver market. But because of the inelasticity of the supply of silver, administration officials argued a purchase of $513 million of silver would result in an increased price for silver and disrupt the market.

Proponents of the proposed law questioned the long run supply of silver. A Bureau of Mines study released this year revealed that the world would face a 5 to 6 billion ounce shortage in silver between now and the year 2000. Faced with a possible future silver crisis, supporters of the bill thought additions to the silver stock was appropriate. They argued that the administration's zero stockpile goal for silver placed too much dependence on imported silver from Canada and Mexico. Such reliance on the imports from Canada and Mexico was inappropriate the

proponents of the purchase argued as the stockpile is "to decrease and prevent, whenever possible, a dangerous dependence on the U.S. upon foreign nations for supplies of these materials in national emergencies."

June 2 and June 4, 1981

The Committee on Armed Services of the U.S. House of Representatives held hearings on two proposals relating to silver in the National Defense Stockpile -- HR 2784 and HR 2603. HR 2784 would authorize the disposal of all 139.5 million ounces of silver in the stockpile, while HR 2603 called for appropriations to purchase silver, platinum and nickel.

The primary area of disagreement concerned the amount of silver needed in times of emergency. Proponents of the silver sale argued that the entire silver inventory of 139.5 million ounces was surplus, since the proper goal was zero. They argued that the surplus silver should be sold and funds from the sale be used to purchase metals in critical shortage--e.g., cobalt and titanium. They noted that, of stockpile materials, 37 are short of stockpile goals. Materials in deficit in the stockpile included aluminum, chromite, cobalt, copper, manganese and platinum. The proponents of the sale noted that there had been no major stockpile acquisition since 1960 and argued that the revenue from the silver sale should be used to offset new acquisition costs. Even if U.S. domestic production fell short in an emergency period, the supporters of the silver sale felt the U.S. could rely on the relatively stable imports from Mexico and Canada.

Opponents of the sale of silver felt that the stockpile inventory should be retained or increased as silver "is going to be the first strategic metal in the world is going to run out of at reasonably traditional prices". Supporters of the silver purchase argued that the U.S. needed to add to the silver stockpile as the present stockpile will not be sufficient in the future. In case of a full national emergency, those opposed to the sale felt that depleting the U.S. silver stockpile would make the U.S. increasingly dependent upon foreign silver. One Congressman argued that it was unrealistic to rely on silver imports from Peru, Canada and Mexico. As a case in point, he alluded to growing anti-American sentiment in Canada stemming from the belief that Americans had exploited Canada's cheap natural resources.

June 17, 1981

The Senate Committee on Armed Services held hearings to discuss the merits of S 906 -- a bill to authorize the purchase of materials for and the sale of excess materials from the national stockpile. The bill proposed the purchase of $2 billion in needed stockpile materials, to be financed by the sale of over $2 billion in excess stockpile material.

The administration deemed the following as priority items for stockpile acquisition: aluminum oxide, bauxite, cobalt, columbium, fluorspar, manganese dioxide and nickel. The "authorization for the sale of silver is particularly important if we are to meet our program goals" an administration witness testified. The bill proposed the sale of the entire silver stockpile (139.5 million troy ounces).

Administration officials stressed that failure to approve the silver sale would result in other forms of funding being necessary. (It is important to remember that the proposed sale and purchase of stockpile material came during the first Reagan budget -- a period of concern over the size of the national debt and the national budget and corresponding deficit.) Of the $2.139 billion estimated revenues to be generated from the sale of excess stockpile materials, over $2 billion would come from the sale of silver. The administration estimated that the silver would be sold at the rate of 1 million ounces of silver per week for a period of two and a half years. When questioned about the effects of the proposed silver sale on the silver market, the manager of the stockpile reported that "I'm confident we will not disrupt the market. But whether or not we will be able to succeed in marketing the total amount, that is the question.

Critics of the proposed sale argued that the zero stockpile goal for silver was unrealistic. They asserted that, given the uncertainty of long run silver supplies, the sale of the entire silver stockpile was questionable. The critics also found fault with the administration's reliance on imported silver from Canada and Mexico in case of an emergency. "While Canada and Mexico are good neighbors, no automatic assumption can be made that silver output from these countries is entirely available to the U.S." one critic said.

June 24, 1981

The Senate Committee on Commerce, Science and Transportation heard administration officials testify about the role of silver in the strategic stockpile. Based on a estimated three year emergency situation, the officials concluded that the U.S. had more silver than it would need. Indeed, the entire silver stockpile was in excess of the administration's goals. "If we do get permission to sell it," one witness reported, "we would have to take steps to make sure it was an orderly disposal." The officials felt the sale of the 139.5 million ounce inventory would not disrupt markets.

August 13, 1981

President Reagan signed into law PL 97-35, the federal budget for the coming fiscal year. Included in the law was the provision for the sale and purchase of several stockpile materials.

Effective October 1, 1981 the President was to authorize the sale of several metals in the National Defense stockpile. All of the metals authorized for sale had inventories greater than the current requirements in the stockpile. Included in this sale were 1,000 short tons of antimony and 46,537,000 troy ounces of silver.

The law further authorized the sale of eight materials on October 1, 1982. These metals again had inventories greater than the current goals. To be included in this sale was an additional 44,682,000 troy ounces of silver and 100 short tons of antimony.

Another sale on October 1, 1983 was authorized where 13,900,000 troy ounces of silver and 1000 short tons of antimony was scheduled for disposal.

PL 97-35 stipulated that the 1982 and 1983 sales of silver would not be effective unless the President determined that the silver authorized for disposal was indeed in excess of the requirements of the stockpile at that time. The determination of the President was to be made no later than September 1, 1982. The law further stipulated that, in making his decision, the President was to consider

(i) the demand for silver for the next ten years for industrial, military and naval uses;
(ii) the domestic supply that would be available to meet the demand;
(iii) the potential dependency on foreign imports of silver;
and
(iv) the effects of disposals on the world silver market, the silver mining industry, and long run military preparedness.

December 29, 1981

The Department of Defense Appropriation Act of 1982--PL 97-114--was signed into law by President Reagan. Included in the law was section 788 which prohibited any sale of silver from the National Defense Stockpile which was authorized by PL 97-35.

Any future sale of the silver inventory of the stockpile will be contingent on the determination by the president of the appropriate stockpile requirements for the metal. The current stockpile objective for silver inventory has been a controversial goal of zero. Attempts to sell the excess inventory of the metal have been blocked since 1976. Finally, the staggered sale of the silver inventory over a three year period was approved as part of the first Reagan budget. The required Presidential determination of the appropriate silver stockpile level was due not later than July 1, 1982.

Congress stipulated that the President consider several factors when determining the appropriate silver inventory. First, Congress said the President should review the

findings of a Government Accounting Office (GAO) report on the sales of silver which occurred since passage of PL 97-35. The GAO report was due by January 1, 1982.

Second, the President must determine the amount of silver needed to meet defense, civilian, industrial and monetary requirements. Included in this Presidential report were to be the projected increases in future silver production. Congress specified that the report should critique botht eh accuracy and reliability of the data on which such production projections were based.

Third, Congress required that Reagan assess the current reliability of silver supplies from foreign sources. The economic and national security implications resulting from the U.S. dependence on these imports was also to be examined.

Finally, President Reagan's report must take in account the long run needs for silver in the stockpile in light of recent projections by the U.S. Bureau of Mines.

The law required President Reagan to report to both the House and the Senate if he determined that the current silver inventory was in excess of stockpile requirements. This report to the Congress must include the basis for such a decision and his recommended method of disposal. However, regardless of the disposal method, no disposal of the silver stockpile would occur without Congressional approval.

June 9 and 10, 1982

A subcommittee of the Senate Committee on Armed Services held hearings to discuss the merits of two proposed bills relating to the strategic stockpile. One bill, S 1982, would reform the manner in which the national stockpile has been managed. The other bill--S 2429--proposed the purchase of almost one quarter of a million tons of copper for the national stockpile.

The proposals in S 1982 were aimed at consolidating management of the national stockpile. Senator Harrison Schmitt (R., N.M.), sponsor of the bill, argued that past management of the stockpile had been inefficient. As an example of mismanagement, he cited that stockpile goals have been changed frequently in the past but not always consistently.

The Senator referred to the inventories of aluminum, copper, lead, nickel and zinc as cases in point. At one time the stockpile goals for these metals was set a zero; consequently, between 1963 and 1975 all of the stockpiled aluminum, copper, and nickel was sold, as was most of the zinc and about half the lead inventory. Schmitt noted that the present stockpile goals of these metals would necessitate the purchase of these metals at a current market prices significantly higher than the prices at which these metals were initially sold.

The Senator noted that previous administrations have exploited the stockpile for budgetary considerations. For example, the Reagan administration has sought the sale of $2.14 billion of stockpile materials while only planning to acquire ¢60 million of new stockpile materials.

The failure of the stockpile management to respond to market influences was also pointed out. "We were only recently selling silver at $8 to $9 per ounce and driving the price lower with the sales, to the detriment of our domestic producers," said Senator Schmitt.

To remove the management of the stockpile from political and budgetary considerations, the Senator proposed the establishment of a strategic stockpile commission. This commission would centralize in one agency all the participants in managing the stockpile.

The second bill, S 2429--sponsored by Senator DeConcini (D. Az.)--sought to authorize the acquisition of nearly one quarter of a million tons of copper for the national stockpile. The Senator mentioned two reasons for passage of the bill: (i) the purchase will aid the domestic copper industry and (ii) the stockpile inventory of copper is significantly below its goal.

DeConcini argued that the bill will help avoid the "possible collapse" of the U.S. mining industry. He noted that the domestic copper producers see little improvement in the current situation until the nation experiences significant recovery in the housing and automobile industries. The Senator noted, in Arizona alone, that over 8,600 copper workers were out of work.

Even though the stockpile goal for copper was set at one million tons, DeConcini reported that current inventory was less than 30,000 tons. Given that the current price of copper was 72 cents a pound--the lowest price, adjusted for inflation, since the depression--the Senator argued it was a "good time to buy copper."

Given the current concern on fiscal responsibility, DeConcini stressed that the purchase would not require the appropriation of any funds. The acquisition could be made with money in an already existing transactions fund.

Administration witnesses were opposed to S 2429 as they felt that the scarce funds could be used to purchase stockpile materials that were in more critical need than copper.

April 15, 1983

The Senate Committee on Banking, Housing and Urban Affairs held hearings on S 269 which would authorize the reissue of silver dollars utilizing the silver in the national defense stockpile.

Previous Congressional action had halted the sale of stockpiled silver. The Government Accounting Office (GAO) recommended that other alternative methods of disposing the surplus silver be considered. Specifically, a January 1982 GAO report suggested a bullion coinage solution. However, the report cautioned that a successful silver coinage program was dependent on public demand.

The Senator who introduced the bill--James McClure (R.Idaho) said that the sale of silver coinage should not be as disruptive to the silver market as the sale of silver bullion. The Senator argued the coinage bill should meet the following objectives: (i) its sale should not disrupt the market, (ii) it would maximize the return to the Treasury and (iii) it would not be a windfall for consumers of silver.

4

Individual Minerals

A. Aluminum

Although the United States and Canada are both dependent on foreign sources for bauxite, the U.S. is the world's largest producer of aluminum and Canada is the third largest producer. And, given its domestic position, the U.S. is not critically dependent on foreign imports for domestic consumption. For example, in 1978, of all domestically consumed aluminum, only 11 percent was imported. With respect to the aluminum that is imported into the U.S., Canada has played a dominant role. The Canadian export - oriented, aluminum industry has concentrated on sales in North America. In 1955, 38 percent of aluminum exported from Canada went to the U.S. In 1965, the U.S. received 49 percent of Canada's exports of the metal and, in 1974, 74 percent. Canada remains the principal supplier of aluminum to the U.S. Between 1977 and 1980, 62% of all aluminum imported into the U.S. originated in Canada.

Given this relation between the two countries, the resulting trade relations between Canada and the United States could pose some interesting problems. When U.S. demand is low and excess capacity exists, the U.S. may wish to reduce the amount of Canadian imports, in order to protect U.S. aluminum producers. On the other hand, when U.S. demand is high, Canadian producers might be induced to withhold output to obtain a higher price. However, these potential conflicts have for the most part been avoided because of the institutional relations that exist between the Canadian and the U.S. markets.

Alcan -- the major Canadian aluminum producer -- owns several fabricating plants in the U.S. It seems unreasonable that the managers or workers of these plants would wish to block access to the U.S. market. Over the years Alcan has developed close business ties with other independent fabricators. The owners of these independent U.S. fabricators rely on imported Canadian aluminum and have proven to be a successful lobby in protecting Canadian access to U.S. markets. The incentive to restrict Canadian imports is further reduced in that Alcan sells aluminum in the U.S. in a way similar to domestic producers -- it follows a producer price system, quoting the same price as major U.S. producers.

Furthermore, of the aluminum that the U.S. exports, a sizeable portion goes to Canada. (For example, almost 20 percent of the U.S. aluminum exports in 1976 went to Canada.) Any attempt to restrict the flow of Canadian aluminum into the United States could result in retaliatory actions by Canada against U.S. exports.

While, in the main, there has been no significant attempt to restrict Canadian imports of aluminum, there has existed the

question of dumping by Canada. Specifically, in May 1972, the U.S. Treasury Department began investigating whether Canadian aluminum ingots were being dumped on the U.S. market.[1] It was the second largest antidumping investigation ever initiated by the Treasury Department and the fourth major investigation of that year involving a Canadian import. This additional investigation certainly did not help to relieve the growing trade tensions between the U.S. and Canada. The Treasury Department ruled, in May of 1973, that the imported metal was being dumped on U.S. markets.[2] The case was referred to the U.S. Tariff Commission to determine if the domestic industry was being harmed. An affirmative ruling would have resulted in the imposition of "anti dumping duties". Alcan argued that it sold the aluminum at prevailing prices and that it didn't believe that the U.S. "would wish to interfere with the supply of aluminum from one of the principal sources on which there has been long-term reliance." The Tariff Commission ruled in August 1973 that aluminum ingot imported from Canada was not injuring the U.S. industry.[3] (This ruling was certainly not unexpected. The U.S. producer that had filed the original complaint -- Aluminum Company of America -- had subsequently reported to the Commission that it was not being injured after all and requested that the dumping complaint be dismissed).

Aluminum waste and scrap enter the U.S. duty free. The tariff on this product has been continuously suspended by temporary legislation from March 13, 1942 to June 30, 1981. In 1982, the U.S. Congress was taking steps to make the duty suspension permanent. The primary motivation for the suspended duty was to insure domestic producers adequate supplies of their raw materials. It was felt that providing free access of scrap metal to U.S. markets would reduce costs, since it is more energy efficient to recover metal from waste and scrap than to produce it from ores. Indeed, many independent smelters in the U.S. were as dependent on the supply of waste and scrap metals as others were dependent on ore.

In terms of the national stockpile, aluminum inventory has remained at a constant 2000 short tons since 1976. (In the first eleven months of 1975 and 1976 12,000 and 10,000 short tons of aluminum were sold respectively.) Since 1980, the announced goal for the stockpile has been 700,000 short tons; but no major acquisitions have taken place.

The tariff structure for aluminum products was altered with the adoption of the Tokyo Round. The tariffs for both unwrought aluminum (in coils) and wrought aluminum were converted from specific to ad valorem rates. While the tariff for wrought aluminum will remain a constant 3 percent between 1980 and 1987, the tariff for unwrought aluminum coils will fall from 3.1% in 1980 to 2.6% in 1987. The tariff for other unwrought aluminum was not converted into ad valorem rates but it will also decline from 0.8 cents per pound in 1980 to become duty free in 1987. This removal of the tariff on unwrought aluminum was requested by Canada during the Multilateral trade negotiations.

In return, Canada agreed to remove its own tariff on unwrought aluminum. This action should be a net benefit for Canada's primary aluminum industry which already is the worlds largest exporter and lowest cost producer. Since the U.S. pre-Tokyo Round tariff was rather low -- one cent per pound -- Canadian imports may not increase substantially. However, the Canadian industry will benefit by not having to pay many millions of dollars in duties to the U.S.

B. Copper

The United States is essentially self sufficient with respect to copper metal bearing materials. The U.S. consumes lesser or equal amounts than it produces. U.S. copper imports normally represent the interest of U.S. domestic producers in foreign copper producing properties. However, the U.S. has historically imported some of its copper supplies; and Canada has been the primary exporter to the United States.

For the past forty years the Congress has "temporarily" suspended the tariff on waste and scrap copper. As with aluminum, the principal reason for the suspension was to insure an adequate supply of raw materials for U.S. producers. In 1982, given that the last suspension on waste material had expired on June 30, 1981, Congress debated whether the suspension on scrap metal tariffs should be made permanent.[4]

In a Congressional Report, the National Association of Recycling Industries argued that a permanent suspension of the tariff on scrap was "necessary to enable domestic steel, copper and aluminum manufactures to continue, as they have done for four decades, to keep their overall costs down by importing, where essential, recyclable metal scrap materials." The association complained that with the present system a suspension bill had to be reintroduced every three years. Due to the lengthy legislative process, a suspension bill was often delayed and tariffs had to be collected and then later refunded.

In addition to Congressional action, the U.S. - Canada copper trade has been affected by a dumping complaint filed before the U.S. International Trade Commission (ITC). In January 1978, twelve major U.S. copper-producing firms asked the ITC to impose an import quota on refined copper. The producers were concerned about rising copper imports from Chile, Peru, Zambia and Zaire. The chairman of Phelps Dodge (the second largest producer of copper in the U.S.) argued that these four countries were dumping copper on the U.S. market, since they needed foreign revenues to pay increasing imported oil bills. The petition made no specific reference to Canadian firms. However in August 1978, the Commission found that imported copper was damaging the U.S. domestic industry. The commission recommended to President Carter a yearly quota of 300,000 short tons on refined copper imports for a five year period beginning from January 1, 1978.[5] In a message to Congress, on October 20, 1978, President Carter declined to implement the ITC recommendation, arguing that

it would not be in the national interest. President Carter argued that the imposition of the quota could lead to higher inflation, instigate possible foreign retaliation against U.S. exports, and hamper the U.S. government's efforts to reduce trade barriers in the multilateral trade negotiations. Specifically, the President said that "import relief would affect our bilateral relations with Canada."[6]

The major change in tariffs on copper-bearing metals came as a result of the Tokyo Round of the Multilateral Trade Negotiations. The purpose of the negotiations was to determine if certain duties and other import restrictions were "unduly burdening and restricting foreign trade." A major result of the Tokyo round was the conversion of specific rates of duty to ad valorem equivalents. For instance, the tariff for unwrought copper was converted from 0.8 cents per pound on copper content to 1.7% on the value of copper content. The main reason for the conversion to ad valorem equivalents was to maintain the protective nature of import tariffs in the face of inflation. A specific tariff such as 0.8 cents per pound will lose its protective ability as the value of copper increases. However, if the tariff was a function of the value of copper, as the value of copper increased so would the tariff. It is possible, given the value of unwrought copper, that the ad valorem rate may yield a higher tariff than the original 0.8 cents per pound. Ironically, the Tokyo Round, which was an attempt to reduce tariffs, may actually have increased tariffs through the conversion to ad valorem equivalents.

For most commodities, the Tokyo Round resulted in a staged reduction of tariffs over eight years. In the case of copper ore, the tariff was eliminated, resulting in free entry of copper ore between 1980 and 1987. Except for cement copper, the ad valorem tariffs on unwrought copper will decline over the 8 years.

Finally, copper trade between the U.S. and Canada may be affected by the management of the U.S. stockpile. In 1973, the national stockpile objective for refined copper was reduced to zero. Sales of nearly 252,000 tons of refined copper in 1974 reduced the national stockpile to a negligible 489 tons. In 1976 the Federal Preparedness Agency announced a new stockpile goal of 1,300,000 tons of refined copper. This goal was affirmed in 1977. However the total inventory consisted of only 20 thousand tons in

1976 and no sizeable purchases have since been made to reach the goal.[7] In 1980 the goal was revised to 907 thousand tons; but, in 1981, only 26 thousand tons of copper were reported in stockpile.

Finally, it should be noted that U.S. copper imports from Canada seem to be following a downward trend. Between 1971 and 1974, 33% of U.S. copper imports originated in Canada. This percentage has declined over the years -- between 1977 and 1980 only 23% of U.S. Copper imports originated in Canada.

Selenium

Selenium is a metallic substance that is recovered during the refining of copper matter. The metal is a byproduct of the process which recovers the gold and silver content from copper refinery sludges. Known primarily for its use in electronic and photo copier equipment, selenium is used also in glass manufacturing and in chemicals and pigments. Selenium has also been increasingly used as an additive to feed grain for animals. Compounds of the metal have been used to supplement the feed for cattle, sheep, hogs, growing chickens and turkeys. In 1981, the Food and Drug Administration allowed the addition of limited amounts of selenium to the feed of laying chickens. This action was taken notwithstanding a debate over the trade offs of the beneficial and toxic effects of selenium. The Occupational Safety and Health Administration placed selenium sulfide, a compound of the metal, on its list of potential chemical carcinogens.

Between 1973 and 1977, the United States produced, on average, less than half of its selenium requirements. Historically, the principal source of U.S. selenium imports has been Canada. However, there was doubt expressed about whether Canada could maintain its position as the dominant supplier of selenium to the U.S. Between 1971 and 1974, 88 percent of the U.S. imports of selenium came from Canada; but that percentage fell to 40 percent during 1977 - 1980. The reason for the decline is found in the relationship between selenium and copper production. In recent years, an increasing amount of copper has been extracted from selenium-poor ores. Even though Canadian copper production has expanded, production of selenium may remain constant, or even fall, unless other deposits of selenium rich copper ores are discovered. Currently, Canadian selenium production remains almost at its 1960 level.

In terms of long run adjustment, the U.S. demand for imported selenium may fall, since the metal can also be extracted from domestic coal deposits. The mounting energy cost of the seventies led to substitution into U.S. coal; and the increasing use of coal may result in increased U.S. production of selenium, with a corresponding decline in imports.

The flow of selenium metal between the U.S. and Canada is unhampered by any barriers to trade. The U.S. levies no duties on selenium metals -- a practice unaltered by the recent Multilateral Trade Negotiations. Our research indicates that, over the past ten years, there have been no dumping charges brought against Canadian selenium.

Presently, selenium is no longer a stockpile item. In November 1975, the General Service administration reported an inventory of 3,200 pounds of the metal. The last remaining lot of selenium, 2,500 pounds, was sold from the stockpile in May of 1976.

Tellurium

Tellurium is another byproduct of copper processing. Like selenium it is obtained during the process that separates silver and gold content from copper refinery sludge. Tellurium, which is more metallic than selenium, is used in the production of steel, iron, copper and rubber. Its alloys with bismuth and lead are used in semi-conductors.

Since the early seventies, the U.S. has produced only one-half to two-thirds of its annual consumption of tellurium. Canada has been a principal exporter of tellurium to the United States. Between 1973 and 1976, 56 percent of the imported tellurium came from Canadian producers. Because of the increasing use of copper ore with low yields of tellurium, Canadian tellurium production may experience little growth, which could thereby result in a decline of exports. This can be seen in the fact that, between 1977 and 1980, the percentage of tellurium imported from Canada fell to 43 percent (from 56 percent).

In 1972, the last year of the Kennedy Round, the tariff for tellurium metal was set at 4 percent ad valorem. As a result of the Tokyo Round, the ad valorem tariff will fall 0.5 percent per year from 1980 to 1987. In 1987, tellurium will be allowed to enter the United States duty free.

The metal is not a stockpile item. Also, there is no evidence of any dumping charges brought against tellurium from Canada.

C. Nickel

Canada is the world's largest producer of nickel; the United States is the world's largest consumer. A large portion of U.S. nickel consumption is supplied by imports. For example, in 1980, the measure of net import reliance (the ratio of imports to consumption) was 72 percent. Traditionally, the largest source of U.S. nickel imports has been Canada. Between 1971 and 1974, 68% of all U.S. nickel imports came from Canada. The U.S. reliance on imported nickel is expected to continue, as domestic firms produce less than 30 percent of the primary demand. However, the sole dependence on bilateral trade with Canada has steadily decreased over the past ten years. In comparison 1971-1974, only 46 percent of the U.S. nickel imports came from Canada between 1977 and 1980.

Because of its dependence on foreign nickel, it is not surprising that, prior to 1980, nickel ore, unwrought nickel, ferronickel and waste and scrap nickel entered the U.S. duty free. The trade negotiations and resulting tariffs of the Tokyo Round did not alter this tariff free status. Also, in the past ten years, there has not been a case of alleged dumping of Canadian nickel before either the U.S. Treasury Department or the International Trade Commission.

In 1975 nickel was not a stockpile item. However, by the end of 1976 a stockpile goal of 204,335 short tons of nickel had been set. In spite of this goal, the General Services Administration reported no inventory of nickel. The same goal was in effect for the next two years, yet no nickel was purchased. The goal was reduced to 200,000 short tons in November 1980; but, as in the four previous years, the General Services Administration reported a zero inventory of nickel. During the next 11 months, the U.S. government purchased 32,209 short tons leaving the inventory still 167,791 short tons from the announced goal.

The United States government has also been able to affect bilateral U.S. - Canadian nickel trade through antitrust litigation. A Canadian firm -- Inco Limited -- has been a dominant firm in nickel production, as it controls the world's highest quality nickel deposits. Because of its large share of the nickel market, Inco has been subject to the scrutinv of the Justice Department's antitrust division. However, one needs to recognize that U.S. antitrust policy against Inco may have little effect. If Inco ever felt threatened by the litigation, it could remove itself from the U.S. market and force U.S. consumers to come to Canada for the much needed metal.

The first antitrust suit came in 1946 when the Justice Department alleged that the Canadian firm violated the Sherman Antitrust Act. The U.S. government proposed a possible solution in the selling of Inco's rolling mills in the U.S. Inco was opposed to such a solution as it felt a such divestment would inhibit the development of new products. Further, the firm asserted that it did not act monopolistically nor did it charge a high price. In order to protect its producers from foreign investigation, the Ontario legislature passed, in 1947, the Business Records Protection Act which forbids the dispersal of business records to other governments. Partly because of this protection, a limited ruling against Inco was issued in 1948. While the company did not have to sell its rolling mills, it agreed to sell the mill's product only with the condition that the material would not be exported back to the U.S.

Seeking to diversify, Inco purchased ESB Ray-O-Vac -- a battery producer in Philadelphia -- in 1974. The action resulted in a 1976 suit filed against Inco by the Justice Department. It was argued that, since the Canadian firm was involved in research in the potential use of nickel in high-powered batteries, Inco could be a possible entrant into the battery market and could adversely affect competition within that market. A judgement was returned against Inco in 1977. However, the Canadian firm was able to retain ownership of the battery producer under the provisions that (1) any results of the ongoing research would be readily available to other firms and (2) the firm would not acquire another battery factory. Inco divested itself of ESB - Rayovac in 1982 for other reasons.

D. Zinc

Zinc has become a metal of critical importance for all industrial societies. The increasing need for the metal is indicated by the significant postwar growth in world production, consumption and identified reserves of zinc. Mine production of zinc in non-Communist countries increased from 1.677 million tons in 1948 to 4.720 million tons in 1977. Similarly, zinc smelter production in the free world was 1.558 million tons in 1948 compared to 4.421 in 1973.

The primary use of zinc--nearly 40 percent of all the total consumption of the metal for non-Communist nations--is in the galvanizing of steel and iron. This process is a preventative measure taken to reduce corrosion. The use of zinc in die castings is the second largest use of the metal accounting for 30 percent of consumption. Along with copper, zinc is required in the manufacturing of brass. Rolled zinc is an input in the production of dry cell batteries, house gutters and drain pipes. Zinc is also used as a pigment in paints and as a component in cosmetics and medicine.

The substitutes for zinc are limited and more costly. Aluminum and cadmium may be used as a non-corrosive coating for iron and steel but their high cost makes such use minimal. The use of plastics lack both the structural integrity and heat resistance offered by zinc. With the increased cost of oil, the feasibility of plastics as a substitute for zinc is lessened as plastics are a petroleum product.

There has also been a decline in the rate of growth in the use of zinc in die castings. This is not surprising in light that the automobile manufacturers are the primary employer of die castings. Given the fall in the rate of growth of car production and the increased emphasis on lighter cars, the demand for zinc in die castings has decreased. Again, possible substitutes include aluminum and plastics. However, since aluminum and plastics are quite expensive, their cost advantage over zinc has diminished and the substitution for zinc has been less rapid.

Thus given current technology, the importance of zinc to industrial societies seems evident in light of the limited substitutes available. Such substitutes as aluminum and plastics are not only expensive but may have undesired structural characteristics--e.g., aluminum has a higher melting point than zinc and hence it would cost more to smelter aluminum than zinc.

The U.S. has been dependent on zinc imports since 1941. In 1950, the U.S. imported 37 percent of its total zinc requirements. However, in 1970 the U.S. imported 60 percent of its zinc consumption and it was estimated that in 1981 the U.S. relied on imports for 67 percent of its consumption. Though the gap between U.S. zinc production and consumption has varied, it is evident that the long run trend for the U.S. has been one of increasing reliance on imported zinc to satisfy domestic demand.

The increased U.S. dependence on foreign imports is not surprising when U.S. zinc production is taken into consideration. Since World War II, the U.S. has been the only significant producer of zinc that failed to increase zinc metal production. In 1960, the U.S. mined 16.8 percent of the total zinc extracted from non-Communist nations. However, in 1974, the U.S. share fell to 11.2 percent. The decline in zinc production is also evident in smelter production. In 1960, U.S. smelter production was 787,100 tons; but, in 1974 production fell to 574,900 tons.

The decline in U.S. production was due mainly to plant closure. But this decline in U.S. smelter cannot be attributed solely to foreign competition. Many were forced to shut down because of increasingly stringent environmental regulations or obsolete machinery. Other smelters could not compete for the concentrate feed.

The importance of zinc to other industrial societies is indicated by the fact that since the 1970's, zinc has become the fourth largest non fuel mineral commodity, by value, in international trade (following iron ore, bauxite, and copper). The United States is by far the largest importer of smelted zinc metal and the U.S. and Japan are the two largest importers of zinc ore.

In spite of its postwar decline in zinc production, the U.S. was the largest producer of zinc metal until it was replaced by Canada in 1964. The Canada zinc metal production experienced rapid growth during the Fifties because of the European Recovery Program and had experienced renewed growth since 1965. However, in spite of increased Canadian production, since the early 70's, Japan has replaced Canada as the world's largest producer of zinc metal. This is not surprising in light of Japan's increased zinc consumption and that it imports over two thirds of its ore. This heavy reliance on imported ore necessitated a higher smelter capacity and growth in zinc production than Canada's.

Canadian smelter production of zinc metal increased from 236,700 tons in 1960 to 432,700 tons in 1974. Thus between 1960 and 1974, Canadian smeltered zinc grew at a compound annual growth rate of 4.5 percent while the U.S. production decreased at an average compound annual decline of 2.3 percent. It is noteworthy that even though Canadian zinc consumption has increased, it is still less than Canadian zinc production. In 1960 Canadian zinc consumption was 50,800 tons in 1960 compared to 137,000 tons in 1974.

This surplus Canadian zinc production, coupled with a common border with the U.S., explains the increased growth of Canadian zinc imports to the U.S. Mexico used to be the most important exporter of zinc to the U.S. until the mid 50's. However, between 1977 and 1980, 50 percent of all the U.S. imported zinc metal came from Canadian producers.

Canada has become the world's largest exporter of both zinc concentrates and metal. Thus, in an indirect way, the U.S. is much more dependent on Canadian zinc. Much of the zinc

metal the U.S. imports from Britain and Japan was made from Canadian ore.

In the past, the U.S. was the only country that levied a duty on zinc ore. With respect to Japan and Europe, however, the U.S. has a lower tariff on zinc metal. Because of effective non-tariff barriers in Japan, Canada sends the majority of its zinc metal exports to the U.S.

Before the Tokyo Round, the U.S. levied a tariff of .67 cents per pound on zinc ore. Many in the U.S. zinc industry felt that the tariff placed the domestic producers at a disadvantage in competing for the limited supplies of available zinc ore. In effect, the duty on imported ore increased the cost of raw material for U.S. producers. Others argued that the tariff on ore did not protect the U.S. mining industry as foreign ore was relatively scarce.

In an attempt to remove this penalty on the U.S. zinc smelters, in 1975 Congress voted to temporarily suspend the tariff for three years. In 1980, a similar bill was passed to suspend the tariff until 1984.

As a result of the Tokyo Round, the U.S. tariff on zinc ore will fall from .67 cents per pound in 1980 to .30 cents per pound in 1987. The ad valorem tariff on zinc metal will fall from 1.9 percent in 1980 to 1.5 percent in 1986.

In 1978, the U.S. International Trade Commission ruled that the U.S. domestic industry was not being harmed by imports of unwrought zinc. U.S. zinc producers were seeking an increase in the tariff to 7 cents a pound and the establishment of an import quota of 350,000 tons a year.

E. Tungsten

As was the case with nickel, the U.S. is the world's largest consumer of tungsten. Because of its hardness and corrosion resistance at high temperatures, the chief use of the metal is as a carbide -- an alloying constituent. Notwithstanding its considerable proven reserves of the metal, the U.S. has imported from one quarter to four fifths of its annual tungsten requirements since 1980. The ratio of imports to consumption in 1980 was 56 percent. In the future, unless the U.S. develops the technology to extract and refine tungsten from low grade deposits, imports can be expected to provide an increasing share of tungsten for U.S. consumption.

The tungsten industry in Canada is relatively young. The country produced no significant amounts of tungsten before 1964, but Canadian production has increased over the subsequent years. In light of expected increases in demand and higher prices, Canadian production was expected to be equal to U.S. production in 1979. Between 1971 and 1974, 23 percent of the U.S. imported tungsten came from Canada. During 1977 - 1980 this percentage increased to 30 percent. Due to the anticipated growth in demand, the continuing

decline in U.S. reserves, and the growth of the Canadian tungsten industry, there is reason to expect Canada to continue being the largest supplier of imported tungsten to the U.S. However, because of the normalization of relations between the U.S. and Mainland China, the dominant role of Canadian imports may be uncertain. More than half of the world's estimated reserves of tungsten lie in China and, between 1977 and 1980, 11 percent of tungsten imported in the U.S. came from China.

Before the Tokyo Round, the U.S. tariffs on tungsten -- ores, concentrates and processed materials -- were relatively high and effectively limited Canadian exports. The tariff on ore and concentrates (25 cents per pound) was the rate proposed in 1972, the last year of the Kennedy Round. The tariff proposed by the Tokyo Round for tungsten ore and concentrate was 17 cents per pound. This tariff is unique in comparison to the others negotiated during the Tokyo Round in two ways. First, the tariff remains a specific rate; it was not converted into an ad valorem rate. Second, instead of declining over an eight year period like most other commodities, the 17 cents per pound tariff remained constant between 1980 and 1981.

Before the recent multilateral trade negotiations,, the tariff on ferrotungsten was 21 cents a pound plus 6 percent ad valorem. As a result of the Tokyo Round negotiations, the tariff remained unchanged in 1980 and 1981. In 1982 the tariff would convert to an ad valorem rate of 8.8%. This rate will be reduced over the next six years to 5.6% in 1987. Before the trade negotiations it was felt that, even given Canada's large reserves and comparative cost advantages, the high U.S. tariffs would prevent the increasing use of Canadian tungsten to satisfy U.S. demand. However, the result of the Tokyo Round may lead to an expansion of Canadian imports.

Bilateral trade of tungsten between U.S. and Canada has not been affected by any dumping allegations. However, bilateral trade may be affected by the U.S. government's stockpile policy. Over the past six years, the stockpile has consistently had a tungsten inventory in excess of the stated goal. As a result, the government has been selling tungsten from the stockpile. Between 1975 and 1977, sales from the stockpile of tungsten ore ranged from 3,515,000 pounds to 3,708,000 pounds. In 1978, 4,355,000 pounds were sold. The stated stockpile goal was increased in 1980 to 55,450,000 pounds (from the 8,823,000 goal in effect since 1976). Sales fell to 1,671,000 pounds in 1980 and to 678,000 pounds in 1981. The stockpile also has an inventory of nonstockpile grade of tungsten concentrate -- 40 million pounds in 1975. As of November 1977 this concentrate was authorized for disposal. By November 1978, 917,531 pounds of this nonstockpile grade had been sold. In 1980, 880,000 pounds were sold and, in 1981, 669,000 pounds were sold.

F. Silicon

The demand for silicon in the United States is closely related to steel and aluminum production. Steel producers are the main consumers of ferrosilicon, while aluminum manufacturers are the primary consumers of silicon metal. The U.S. Bureau of Mines reports that reserves of silicon in major producing countries such as the U.S. are large relative to annual consumption. Indeed, in 1980, it was estimated that ratio of imports to consumption of silicon was only 8 percent. (The highest import reliance measure for silicon was the 17 percent obtained in 1978.)

A particularly interesting feature of silicon is the growth in Canadian imports to the U.S. In January 1976, the U.S. Bureau of Mines reported that rapid growth was projected for exports of silicon from the Province of Quebec. The report mentioned that changes in fuel or electrical energy cost would have a major influence on the projected increase in growth. Between 1971 and 1974, Canada ranked fourth as a source of silicon to the U.S., with only 8 percent of imported metal coming from Canada. However, during the period 1977 - 1980 Canada became the dominant supplier of imported silicon to the U.S. -- 28 percent of the imported metal came from Canada.

As of November 1976, the National stockpile contained an inventory of 80,619 thousand short tons of silicon carbide. This stockpile was considerably below the targeted level of 306,628 thousand short tons. The level of inventory has remained fairly constant at around 80,000 since 1976. However, in November 1980 the targeted level was reduced to 29,000 thousand short tons. The inventory is now greater than the goal (in 1981 the inventory was 80,548 thousand short tons). Therefore, future sales from the stockpile may be anticipated.

The sudden increase in Canadian imports in the late 1970s led to charges of dumping silicon. Imports from Canada arose from 540 tons in 1976 to nearly 11,000 tons in 1977. On December 7, 1978 the Treasury Department ruled that Canadian silicon was being dumped on U.S. markets.[8] The department determined that between September 1977 and February 1978, the period of investigation, primarily all of the imported silicon came from SKW Electro-Metallurgy Canada Limited. The Treasury Department determined that almost all of SKW imports were being sold at unfairly low prices. Antidumping duties where not imposed, however, as the International Trade Commission ruled that the imported silicon was not damaging the domestic industry.[9]

The Tokyo Round resulted in a change in the tariff structure for most forms of silicon. During 1980 and 1981, the tariffs for all forms of ferrosilicon remained at their pre Tokyo Round specific rates. However by January 1, 1982 the tariffs were converted to ad valorem rates. It was felt that the use of ad valorem rates would ensure the protective content of a tariff. It was felt that a specific rate such as 0.5 cents per pound on silicon content lost it's

protective nature as the price of the metal increased due to inflation. The use of an advalorem rate may even increase tariffs depending on the metal price. Also for most grades of silicon, the advalorem rates were to remain constant over the next six years. In other words, the ad valorem rates for most silicon grades will not decline over the eight years affected by the Tokyo Round, as would the tariffs on other commodities.

G. Silver

Having once been the world's largest producer of silver, the United States is now the fifth largest producer of the metal. Even though the consumption of silver follows a cyclical trend, the trend has been rising. The U.S. has long been dependent on silver imports. For example, in 1977 the U.S. silver demand of 165 million troy ounces was four times as large as the domestic silver production of 37.4 million troy ounces.

In 1950 the U.S. imported 68 percent of its silver consumption. During 1969-73, the ratio of U.S. silver imports to domestic consumption averaged 58 percent. Though domestic silver production has ranged from 30 million troy ounces to 45 million troy ounces, the average annual production during 1949-52 was 38.8 million troy ounces. However, during 1975-77 the annual average of silver production fell to 35.6 million troy ounces.

Canada is the third largest mine producer of silver and has been the primary source for U.S. imported silver. In five year period of 1973-1977, the U.S. received 33 percent of its silver imports from Canadian producers. During 1975, Canada exported 79.1 percent of its refined silver production of which the U.S. received 98.4 percent. In 1976 the U.S. purchased 99.1 percent of the refined silver that Canada exported. In that year, Canada shipped abroad 92.5 percent of its refined silver production. The U.S. also actively imports Canadian silver ore. In 1976 Canada exported 33.6 percent of its ore production, 63.8 percent of which was purchased by U.S. producers. During 1876, the U.S. purchased 90 percent of the value of total Canadian silver exports.

The uses of silver are varied. The traditional use of silver as coinage has declined drastically. During 1976, 32.4 percent of all the silver consumed in the U.S. was in photography. Silver is also currently used in electrical contact and conductors. The metal is used in the production of silverware. Other uses of silver include its employment in the manufacture of high quality mirrors, rechargeable batteries and high quality electric solders. The growth in the number of uses of silver implies an increase in the rate of growth of silver consumption.

Like lead, silver is generally extracted as a byproduct during the process where zinc and/or copper is obtained from mixed ores. Generally, in the case of Canadian mixed ores, the zinc and copper contents appear in more valuable

quantities than silver. Hence the production of silver is dependent on the market conditions of the base metals of zinc and copper. Increased demand and prices for silver may have less effect on silver production than increased demand for zinc and copper.

Canada's production of silver is limited in that it almost entirely results from copper or zinc production. During 1975-76, only 4 percent of Canada's silver production came from deposits mined primarily for their silver content. However, of the silver production in the U.S. during 1973-1977, 34 percent of it came from deposits that were exploited solely for the purpose of obtaining silver.

Even though the U.S. has been out produced by Russia, Mexico, Canada and Peru, its reserves are second only to that of the U.S.S.R. U.S. silver reserves--1,500 million troy ounces--are about one quarter of those of the rest of the world. Given the large silver reserve, why the low level of U.S. production and the continued dependence on silver imports? Since silver is often a joint product of zinc and copper, the static U.S. silver production is often linked to the ailing U.S. zinc and copper production. Environmental concerns have also retarded the growth in U.S. silver production. Open pit mining has been curtailed and the U.S. Environmental Protection Agency requirements have been costly to meet. Producers had to implement expensive steps to protect ground water and streams.

Thus the U.S. has been able to import silver at prices competitive with the increasing costs of increasing domestic production. During 1945-67, Canadian silver production expanded significantly as Canadian production of copper, lead, and zinc grew. However, since 1967, Canadian silver production has remained rather static. Canada may face competition for the U.S. silver import market from Peru and Mexico. These two countries have recently increased their rates of production. In 1977, Mexico overtook Russia as the world's leading producer and with its vast reserves and government encouragement of silver production, it will probably expand production.

The silver market in the U.S. may be temporarily disturbed by the sale of the U.S. silver stockpile. As of 1976, the U.S. downgraded the silver stockpile objective to zero leaving a surplus inventory of 139.5 million troy ounces. Since 1976 there have been several attempts in the U.S. Congress to sell the surplus silver stockpile. The proposed sale failed as several Congressmen questioned the reasonableness of the zero stockpile objective. However, faced with large budget deficits and a shortage of other critical stockpile items, in 1981 Congress authorized the gradual sale of the silver stockpile. The funds generated from the silver sale were to be used to finance the acquisition of other desired items.

H. Lead

The United States is both the world's largest producer and consumer of lead. In 1974, 17 percent of the lead produced world wide came from U.S. mines. In spite of its large lead reserves, however, since 1931 the U.S. has relied on imports as more lead was consumed than domestically produced. For the past forty years, the primary source of U.S. imported lead has been Canada. Between 1974 and 1977, 30 percent of the lead imported by the U.S. came from Canadian mines.

The U.S. dependence on imports, however, has decreased over time. In 1950, the U.S. imported 59 percent of the lead it consumed. In 1970 the U.S. imported only 40 percent of its lead consumption and between 1973 and 1977 only 11-29 percent of its lead consumption was imported.

The continued decline on the U.S. dependence on lead imports can be partially attributed to its slow rate of growth of lead consumption. Since World War II, the rate of growth in lead consumption for North America has been significantly lower than the rest of the world. Between 1951 and 1970 lead consumption grew at an average rate less than 1 percent per year. In recent years the rate has increased to 2.6 percent. Nonetheless, with its expanding production, Japan's rate of growth in lead consumption is more than twice that of North America. Compared to North America annual growth in lead consumption, Western Europe's rate of growth is 50 percent larger.

The decreased dependence on imports and the low rate of growth in lead consumed is consistent with the decline in demand for lead products. In the past, the primary use of lead, in order of significance, have been: 1) in the manufacture of storage batteries, 2) as a anti-knock additive in automobile gasoline and 3) as an ingredient in paint pigments. However, either technological progress or government regulation has affected these traditional uses of lead.

Storage batteries provide a source of portable, emergency power. Technological advancements in the design of batteries has significantly reduced the amount of lead needed per battery. Not only have these improvements decreased current demand but the extended life of the new batteries will reduce future lead demand.

Following storage batteries, the second most popular use of lead had been as a gasoline additive. In 1976, 19 percent of the lead consumed was in the form of gas additives. But in a move to reduce exhaust pollutants, the U.S. government has stipulated that newer cars have a catalytic converter which requires unleaded gasoline. As the use of unleaded gasoline increases, this particular use of the metal will decline.

Regulation may also restrict the use of lead in paint pigments. Of the lead consumed during 1975 and 1976, 7 percent of it was in the form of components in paint

pigment. In an attempt to reduce lead poisoning and eliminate other health hazards, government regulations have prohibited the use of the metal in interior paints.
Lead is generally extracted as a by-product in the processing or ores containing zinc or copper. Of the lead produced in Canada during 1975-1976, 95% of it resulted as a by-product in the production of zinc and/or copper. In the case of Canadian mixed ore, the zinc and copper contents are generally more valuable than the lead components. Thus the volume of lead manufactured in Canada is significantly influenced by the market conditions of zinc and copper.

Unlike Canada, the U.S. lead reserves are sufficiently rich enough to be exploited solely for the purpose of extracting lead. Because of this, the U.S. domestic lead production is more flexible than the Canadian market in a changing environment. Compared to its Canadian counterparts, U.S. production of lead can adjust more readily without major disturbances in the zinc and copper markets. With an increase in lead prices or a reduction in environmental standards, the U.S. could become largely self-sufficient in terms of lead consumption.

Due to the decline in U.S. dependence on imported lead, Canadian exporters have had to look elsewhere for new markets. In terms of lead exports, Japan and Europe have become collectively more important than the U.S. market for Canadian producers. Even though Japan has significant tariff and nontariff barriers against imported lead metal, lead ore and concentrates enter duty free. Consequently, Canada has exported significant numbers of lead ore to Japan. During the postwar period, Canadian lead exports to Japan increased more rapidly than those to Britain and the U.S.

The European Economic Community also allows the duty free entry of lead ore and concentrate. During the mid-70s, the EEC levied a 3.5 percent tariff on refined lead. The United States, of all the major lead producers, has been the only nation to levy a duty on lead ore and concentrates. Before the Tokyo Round, the tariff on led ore was 75 cents per pound of lead content and 1.0675 cents per pound was the tariff on unwrought lead.

After the recent Tokyo Round trade negotiations, the U.S. tariff on unwrought lead was converted to an ad valorem equivalent of 3.5 percent. However, some felt that due to inflation and increased demand, the conversion to ad valorem equivalents actually increased the tariff on unwrought lead. In December of 1980, a law was passed to temporarily reduce the duty on unwrought lead until June of 1983. The law, PL-609, reduced the tariff to 3 percent ad valorem on the value of lead content but not less than 1.0625 cents per pound on lead content.

In 1974 the U.S. Tariff Commission ruled that domestic lead producers were being harmed by the dumping of Canadian lead imports. The ruling permitted the assessment of antidumping duties against Canadian imports. In an unusual move, the Treasury Secretary refused to impose the additional tariff

and asked the Tariff Commission to reconsider. The Commission refused to reverse the verdict and penalty duties were imposed on Canadian imported primary lead in April 1974.

Footnotes Chapter 4

[1]On May 18, 1972, the Treasury Department announced that it was investigating whether Canadian aluminum ingots were being dumped in the U.S. In 1971, the U.S. imported $216 million of Canadian aluminum ingot, making this the second largest antidumping action ever initiated by the Treasury. The Treasury department acted on a petition filed by the Aluminum Company of America.

This action was the fourth major investigation of Canadian imports undertaken by the Treasury in 1972. At that time, the U.S. Treasury Department was also investigating the effects of imported Canadian radial tires, sulphur, and rail commuter cars.

In 1971, the U.S. had imported 450,000 tons of primary aluminum from Canada. Hence aluminum was one of Canada's chief export commodities to the U.S. market. Canadian aluminum producer Alcan Aluminum accounted for over 90% of the total.

[2]On May 18, 1973, the U.S. Treasury Department found that aluminum ingot from Canada was being or was likely to be sold in the U.S. at lower prices than in its home market.

An Alcan spokesman said that while Alcan sells at prevailing prices in the U.S. market "We don't set those prices". But he did agree that the price of Canadian aluminum sold in the U.S. may have been lower than the price in Canada during the period that was the subject of the dumping complaint.

[3]On August 16, 1973, in a 4 to 0 vote, the U.S. Tariff Commission ruled that aluminum ingot being imported from Canada was not injuring U.S. industry.

[4]Further, on September 17, 1982, in a report on several miscellaneous tariff revisions, the Ways and Means Committee of the U.S. House of Representatives recommended temporary suspension of the duty on copper scale until September 30, 1985. The committee noted that copper scale is primarily used by secondary smelters and refiners and it is normally not traded except when other metals of value such as argenic or selenium are present. The bill was proposed by American Chemet, an Illinois producer. The company imports copper scale primarily from Canada and refines it to cuprous oxide for use in antifouling marine plant. The bill was necessary, American Chemet officials claimed, because the US copper industry does not produce sufficient quantities of copper scale for their needs and they must import the balance.

[5]On August 23, 1978, the U.S. International Trade Commission ruled in a 4 to 1 vote that the domestic copper industry was being seriously injured or threatened with serious injury by imports of unalloyed, unwrought copper. To prevent such injury, the commission recommended the imposition of a yearly quota of 300,000 short tons on refined copper

imports. The quota was to become effective January 1, 1978 and last for five years. The commission's investigation was initiated by a petition filled by 12 major U.S. domestic copper producers.

The commission noted that with the exception of 1975, refined copper imports increased through 1973 - 1977. The imports in 1977 reached a peak of 387,000 short tons. In the same year, the ratio of imports to consumption was 17.7 percent. The report noted that Canada had been the leading source of refined copper imports during the past 5 years, but 3 other nations, Chile, Zambia and Peru have steadily increased their share of the U.S. Market.

The commission also noted that the domestic copper industry earned profits in 1973 and 1974, suffered losses in 1975, had a modest recovery in 1976 and again suffered a loss in 1977. Imports in 1978 had been at the annual rate of 650,000 short tons.

[6]On October 20, 1978, President Jimmy Carter rejected the proposed 5 year quota of 300,000 short tons on imported refined copper because it was not in the national interest. The president felt that the imposition of the quota would impose significant costs on U.S. consumers of refined copper. As a result of the proposed import relief, domestic copper fabricators would face a higher copper input cost and this cost would be passed on to U.S. consumers in the form of higher prices. The quotas weren't needed, Carter said, because domestic copper market conditions had improved during 1978 and there was an improving outlook over the next several years for both the domestic and world copper market. During 1978, domestic copper production increased and imports had begun to fall from their earlier high levels. The president said that trade adjustment assistance benefits would still be available to copper industry workers.

[7]On November 14, 1978, a subcommittee of the Senate Committee on Banking, Housing and Urban Affairs discussed the implications of strategic minerals in short supply in the nation's stockpile. Of particular concern was the inventory of copper -- 20,433 tons versus the goal of 1,300,000 tons. The 94th Congress approved the sale of 45,000 tons of tin to finance the purchase of 225,000 tons of copper.

[8]On December 5, 1978, the U.S. Treasury Department advised the U.S. International Trade Commission that Silicon metal from Canada was being, or was likely to be sold, in the U.S. at less than a fair value. If the International Trade Commission determined that imports were injuring U.S. domestic silicon producers, then the Treasury Department was to impose anti-dumping duties against imported Canadian silicon.

[9]On March 5, 1979, the U.S. International Trade Commission ruled in a 4 to 1 vote that silicon imports from Canada were not injuring the U.S. domestic silicon industry. The

Commission noted that, in spite of an increase in aggregate U.S. imports of silicon metal during 1978, imports from Canada actually declined by 5 percent. Also, most of these other imports were predominately at prices lower than those of Canadian product. The commission noted that increased consumption, rising producer shipments, sharply reduced producers' inventories, increased capacity, an upward turn in profit, and rising prices characterized the domestic industry. Currently six U.S. firms produce silicon metal domestically.

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FIG. 1: Canadian Money Supply and Consumer Price Index

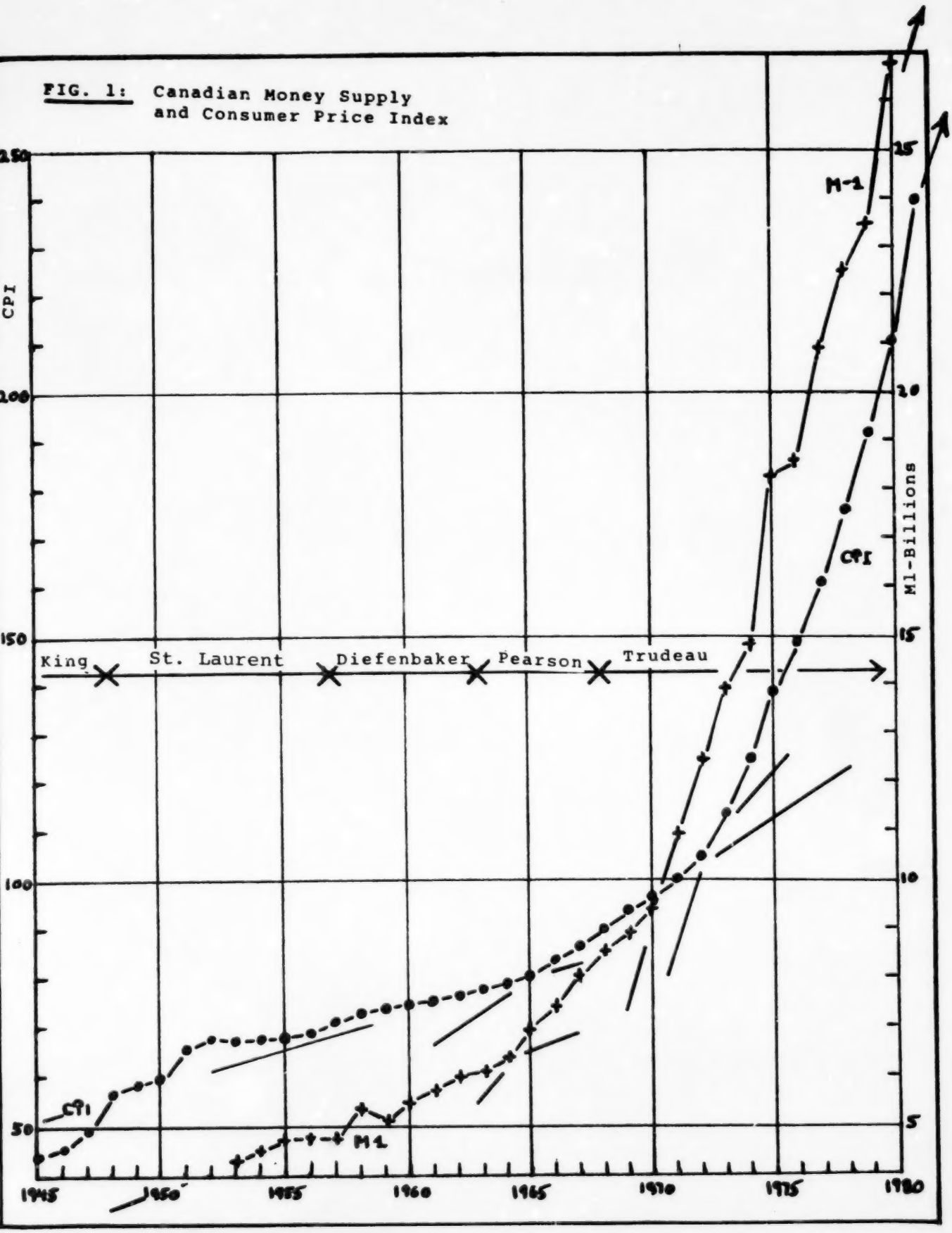

FIG. 2.

THE PRIMARY SUPPLY FUNCTION

$$Q^S_{M,t} = \theta_0 + \theta_1 P_{M,t} + \theta_2 P_{M,t-1} + \theta_3 ROWS_{M,t-1} + \theta_4 D_{M,t} + \theta_5 D_{M,t-1} + \theta_6 t + \theta_7 r_t + \theta_8 r_{t-1} + \theta_9 \sum^{t-2} Q^S_{M,i} + \theta_{10} Q^S_{M,t-1}$$

$Q^S_{M,t}$ = Actual primary production by a specific country group of mineral M in Period t

$P_{M,t}$ = Actual real price, mineral M, period t

$ROWS_{M,t}$ = Rest of World Primary Production, period t

$D_{M,t}$ = Actual World Consumption, Mineral M, Period t

t = Time (Proxy for Technology)

r_t = Interest Rate for Counting Group, Period t

FIG. 3

THE SECONDARY SUPPLY FUNCTION

$$Q^{SCRAP}_{M,t} = \phi_0 + \phi^P_1 P_{M,t} + \phi^P_2 P_{M,t-1} + \phi^P_3 P_{M,t-2} + \phi^D_1 Q^D_{M,t} + \phi^D_2 Q^D_{M,t-1} + \phi^D_3 Q^D_{M,t-2} + \phi^D_4 Q^D_{M,t-3} + \phi_5 Q^{SCRAP}_{M,t-1}$$

$Q^{SCRAP}_{M,t}$ = Total secondary production by a specific country group, mineral M, Time Period t

$P_{M,t}$ = Real Price, Mineral M, Period t

$Q^D_{M,t}$ = Consumption In Country Group, Mineral M, Period t

FIG. 4

The Demand Function

$$Q^{D}_{M,t} = \Psi_0 + \Psi_1 (P_{M,t} - P_{R,t}) + \Psi_2 (P_{M,t-1} - P_{R,t-1}) + \Psi_3 (S_{M,t-1} - D_{M,t-1}) + \Psi_4 Y_t + \Psi_5 Y_{t-1} + \Psi_6 \dot{K}_{t-1} + \Psi_7 \dot{M}_{t-1} + \Psi_8 Q^{D}_{m,t-1}$$

$Q^{D}_{M,t}$ = Actual consumption by specific country group, mineral m, period t

$P_{M,t}$ Actual real price, mineral m, period t

$P_{R,t}$ Actual real price, related commodity, period t

$S_{M,t}$ World primary production, mineral m, period t

$D_{M,t}$ World consumption, mineral m, period t

Y_t Actual real per capita income in the country group, period t

$\dot{K}_t$ Rate of real capital accumulation in the country group, period t

$\dot{M}_t$ Rate of growth of money supply in the country group, period t

FIG. 5

THE WORLD PRICE FUNCTION

$$P_{M,t} = \eta_0 + \eta_1 P_{M,t-1} + \eta_2 P_{M,t-2} + \eta_3 (S_{M,t-1} - D_{M,t-1}) + \eta_4 t + \eta_5 r_t + \eta_6 \sum_{i}^{t-2} S_{M,i} + \eta_7 WQ^{SCRAP}_{M,t-1} + \eta_8 P_{R,t} + \eta_9 P_{R,t-1} + \eta_{10} P_{R,t-2} + \eta_{11} Y_t$$

$P_{M,t}$ Real price, mineral m, period t

$S_{M,t}$ World Primary Production, mineral m, period t

$D_{M,t}$ World consumption, mineral m, period t

t Time, proxy for technology

r_t Interest rate, period t

$WQ^{SCRAP}_{M,t}$ World secondary production, mineral m, period t

$P_{R,t}$ Real price, related commodity, period t

Y_t Real income in period t

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